DRAFT INTERIM ACTION MEMORANDUM

BURLINGTON NORTHERN RAILROAD
MISSION WYE
CECRA SITE

Montana Department of Health
and Environmental Sciences

Superfund Program

June 22, 1995

Declaration of Interim Action Memorandum
Interim Treatment Selection

Site Name, Location and CERCLIS Number

Burlington Northern Mission Wye
Park County, Montana
CERCLIS Number: MTD 980635387

Statement of Purpose

This Interim Action Memorandum evaluates alternatives and selects an interim response action for this site in accordance with the Comprehensive Environmental Cleanup and Responsibility Act (CECRA), §§ 75-10-701 through 75-10-724 (1993) Montana Code Annotated, and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 42 USCA §§ 9601-9675 (1983 and 1995 Supplement.) and not inconsistent with the National Contingency Plan, 40 CFR Part 300 (1994).

Statement of Basis

The basis for this decision is described below. Documentation for this decision is also contained in the administrative record which was developed in accordance with Section 75-10-713 of CECRA and is available for public review at the information repositories located at the Livingston Public Library in Livingston, the Montana State University Library in Bozeman, the Montana State Library in Helena and the Montana Department of Health and Environmental Sciences in Helena.

Assessment of the Site

Pursuant to § 75-10-711 of CECRA, the department finds there has been a release or there is a substantial threat of a release of hazardous or deleterious substances into the environment that may present an imminent and substantial endangerment to public health, welfare, or safety or the environment at the Burlington Northern Mission Wye facility.

Description of Treatment Selection

The selected treatment action for the source of groundwater contamination at the Burlington Northern Mission Wye site consists of excavation and treatment. The proposed treatment is unique because it will rely on resource recovery (recycling) technologies thereby eliminating off-site disposal of hazardous waste. Pre-treatment, primary treatment and post-treatment processes will be implemented. Pre-treatment processes include excavation, neutralization,

screening, sizing and preparation of clay filter material and contaminated soil for primary treatment. Primary treatment processes include thermal desorption, collection of dust particulate, capture and treatment of organic and acid off-gases and production of two material streams which will be recycled or reused. Post-treatment processes include cooling, hydration and stabilization of treated soils. A soil vapor extraction system will be installed to treat soil left in place underneath the excavated and treated clay filter material.

Declaration

The department finds, pursuant to § 75-10-721, MCA, that the selected interim action, as part of a total remedial action, will attain a degree of cleanup of hazardous and deleterious substances and control of a threatened release or further release of those substances that assures present and future protection of public health, safety, and welfare and of the environment.

The department finds that the selected interim action will be consistent with applicable or well-suited state and federal environmental requirements, criteria or limitations, is protective of public health, safety, and welfare and the environment, utilizes permanent solutions, utilizes alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and is cost effective.

_____ _____

DHES Director Date

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I. PURPOSE

The purpose of this memorandum is to evaluate selected alternatives and to document the selection of the proposed interim action for the Burlington Northern Railroad (BNRR) Mission Wye site located in Park County, Montana.

Hazardous substances buried in three unlined waste cells are a significant source of groundwater contamination. Excavation and treatment of the contamination source, including clay filter material, soil and debris, will greatly reduce or eliminate groundwater contamination and the potential for contamination of private residential wells.

After source excavation and treatment, groundwater monitoring will be conducted for a period of one to three years to determine if groundwater treatment is necessary. Considering the hydrogeological characteristics of the aquifer, it is expected natural processes including attenuation, dispersion, dilution and degradation will occur once the source is excavated and treated and that groundwater remediation goals will be achieved. If groundwater remediation goals are not achieved through source treatment, a groundwater remedy will be implemented until remediation goals are met.

Section II of this document describes remedial investigation work performed at the Mission Wye site. Section III summarizes the potential human health and environmental risks. Section IV is an endangerment determination statement. Section V identifies cleanup levels for chemicals of interest. Section VI reviews the process options and alternatives evaluated to cleanup the site. Section VII describes the selected interim action, thermal desorption and associated processes. Section VIII outlines recommendations to achieve site closure after source control is complete.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Site History, Evaluation and Characteristics

From 1955 to 1978, the Mission Wye site was used by BNRR as a disposal facility for acid-clay filter material from an oil reclamation plant located at the BNRR Shop Complex in Livingston, Montana. Solid waste, debris, cleaning agents and other material from the BNRR Shop Complex were also periodically disposed at the site. At the oil reclamation plant (oil re-refining plant) locomotive crankcase oil was mixed with sulfuric acid and pressed through clay filter material. The strong sulfuric acid solution loosened and mobilized contaminants in the oil; the clay filter material removed or filtered contaminants from the oil. Clean, filtered oil was sold and remnant clay filter material was landfilled at Mission Wye in three unlined cells, hereafter referred to as the north, south, and east cells in this document. The clay filter material, contaminated soil and debris contribute to groundwater contamination. This source of contamination is hereafter referred to as the source in this document.

Because of seasonal temperature fluctuations and the low density (compared to native soils) of residual oil contained in the clay filter material, much of the oil has seeped onto the ground and spread out over an area nearly 40,000 square feet and six to nine inches thick. This material is referred to as the asphalt-like substance or ALS.

In 1984 the Environmental Protection Agency (EPA) performed a preliminary assessment of the site. A Listing Site Inspection performed by EPA in 1986 showed soil and groundwater contamination. In February 1987, EPA completed a preliminary Hazard Ranking Score at the Mission Wye but determined the site did not meet the criteria for federal Superfund sites and declared no further action under the federal Superfund Program. The State Superfund program began investigating the site in 1990, pursuant to the Modified Partial Consent Decree between DHES and BNRR.

In the spring and autumn of 1991 and 1992, BNRR, through its contractor Remediation Technologies, Inc. (RETEC), conducted a remedial investigation (RI). The objectives of the Mission Wye RI were to characterize the nature, extent and volume of waste material as well as identify the vertical and horizontal extent of soil, sludge and groundwater contamination. These activities are described below in Part A (3) of this section.

2. Physical Location

The Mission Wye site is located approximately five miles east of Livingston, Montana at the junction of Interstate 90 and U.S. Highway 89 (Figure 1). The mainline railroad track to the south, which is operated by Montana Rail Link (MRL), and two abandoned spur tracks to the north form the Y-shaped intersection. The site is enclosed by a five-foot barbed wire fence and covers an area of approximately five acres. The Yellowstone River flows 4000 feet to the north. Nine residences, which use private wells for drinking water, are located northeast (downgradient) from the site.

3. Release or Threatened Release into the Environment of a Hazardous Substance

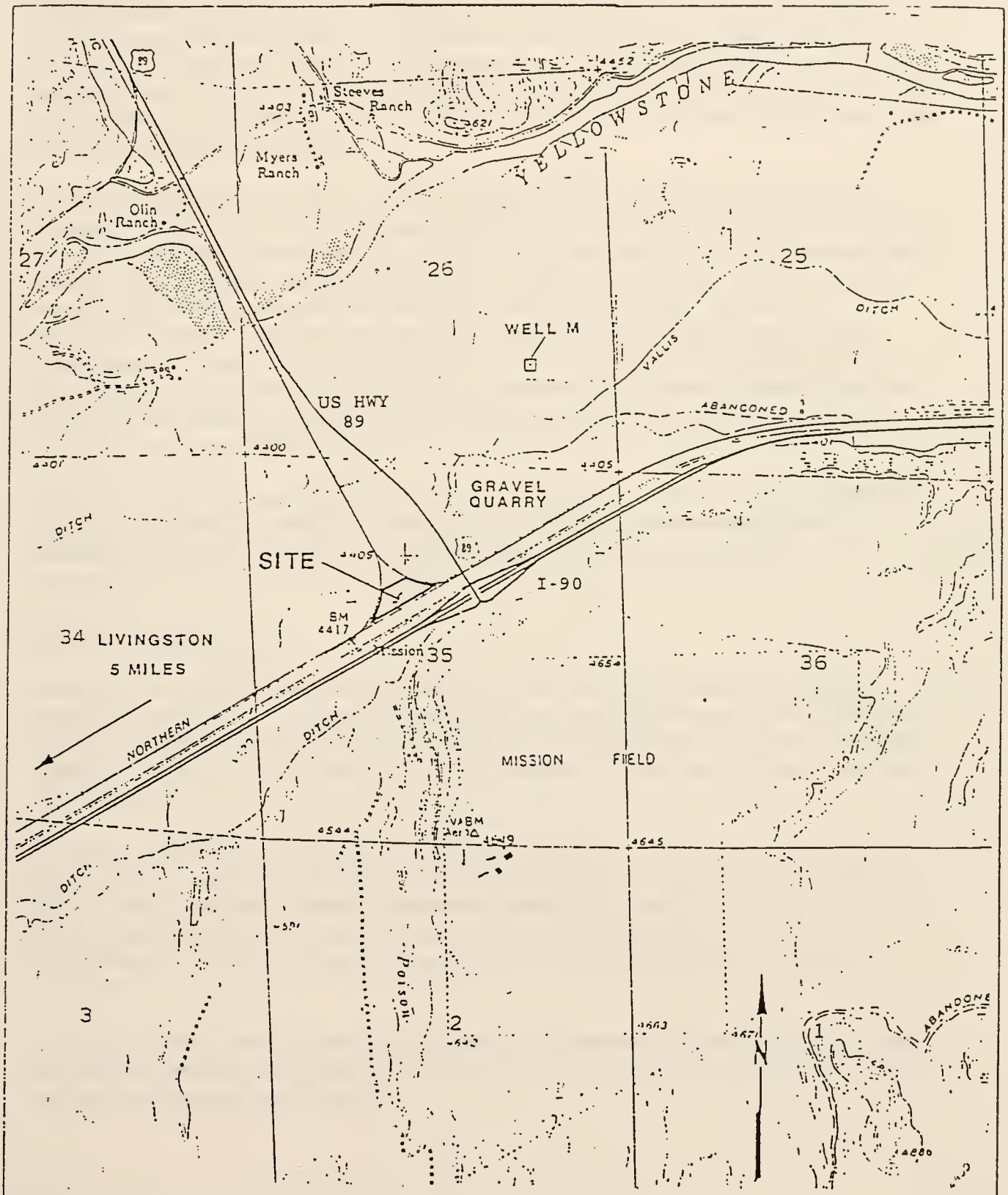
a. Summary of Remedial Investigation

In December 1990 BNRR, through RETEC, submitted a work plan to DHES to conduct a RI. The RI, which has been reviewed, modified and approved by DHES throughout the investigation, was conducted in two phases. The Phase I Report Mission Wye, Montana Remedial Investigation (RETEC, July 1992) presents site information collected during the spring and autumn of 1991. The Phase II Report Mission Wye, Montana Remedial Investigation (RETEC, revised August 1992) presents site information collected during the spring and autumn of 1992. These reports summarize data collected for groundwater, soil, surface water, sediment, and clay waste samples and identify potential pathways for contaminant migration.

FIGURE 1

MISSION WYE CECRA SITE

SITE MAP



Phase I RI, Spring 1991

Soil gas and groundwater samples were collected to determine the impact to the alluvial aquifer. Three wells (PZ 1, PZ 2, and PZ 3 shown in Figure 2) were installed to monitor seasonal groundwater elevation fluctuations. (Monitoring wells MW 1, MW 2 and MW 3 were previously installed by EPA in 1986). On-site groundwater was contaminated with volatile organic compounds (VOCs). Groundwater and soil gas data indicated that VOCs dissolved in groundwater migrate to the east-northeast. This flow direction is consistent with regional groundwater flow. The closest residence is approximately 2500 feet to the northeast (downgradient). Groundwater samples collected in November 1990 from this residential well and others did not contain VOCs.

A layer of perched water found overlying the north cell and a portion of the south cell is assumed to result from surface water and precipitation infiltration. Rainwater passes through soil until it reaches the buried clay layer and cannot migrate any further. The perched water contains tetrachloroethene (PCE), trichloroethene (TCE), other VOCs, iron and manganese, indicating leaching of contaminants from source materials to perched water occurs. Downward seepage of perched water beyond the edges of the clay cell, along with high groundwater in contact with the bottom of the north cell are conduits for contamination to travel from the source and perched water to groundwater. Soil samples collected from test pit excavations adjacent to the cells indicate lateral spreading of contaminants (in areas outside the seep area) had not occurred.

In July 1991, RETEC submitted a Draft Phase I RI Report to DHES. Based on the findings of this report, DHES and RETEC conducted a second Phase I investigation to further characterize clay filter material, contaminated soil and the extent of groundwater contamination.

Phase I RI, Autumn 1991

In August 1991, RETEC installed three borings in the north cell to collect samples and installed monitoring wells. One additional test pit was excavated through both the south and east cells to collect soil samples from underneath the source material. Four new monitoring wells (MW 4, MW 5, MW 6 and MW 7) were installed to further characterize groundwater contamination.

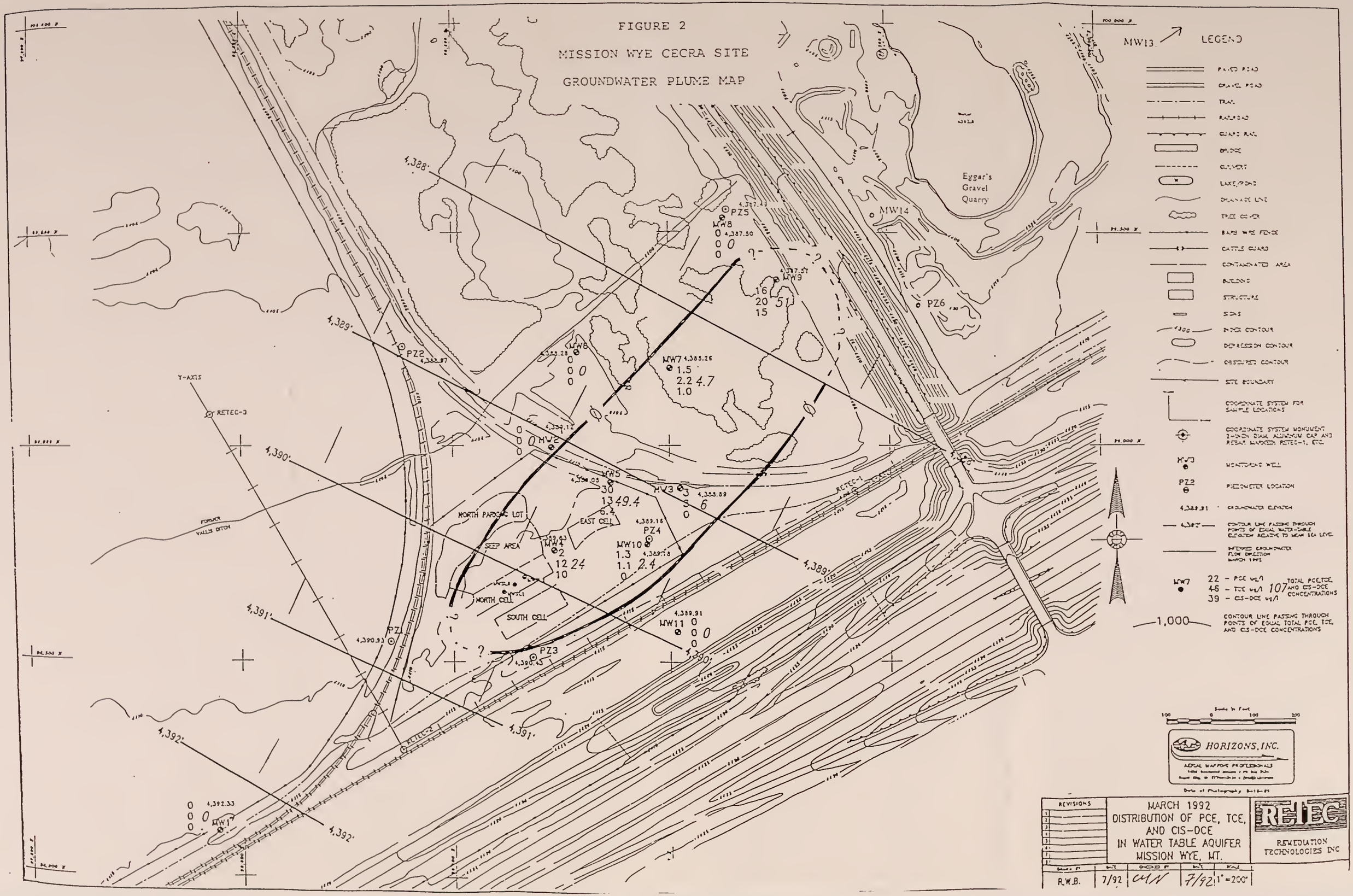
VOCs were detected in on-site and off-site monitoring wells. VOCs detected in MW 3 were three orders of magnitude higher than samples collected during the spring 1991 sampling event. When compared to previous groundwater samples collected by Ecology and Environment (an EPA contractor) in August 1986, the data indicated significant fluctuations in groundwater contaminant concentrations between seasonal high and low groundwater elevations.

Two borings were drilled adjacent to the north cell to determine if dense non-aqueous phase liquids were present at the alluvium/bedrock interface. Groundwater samples did not indicate the presence of these dense liquids.

FIGURE 2

MISSION WYE CECRA SITE

GROUNDWATER PLUME MAP



RETEC submitted a Draft Phase II RI Work Plan to DHES in August 1991. Based on the findings and conclusions discussed in the report, RETEC scheduled Phase II groundwater investigations during 1992.

Phase II RI, Spring 1992

In March 1992, RETEC conducted groundwater sampling at seven monitoring wells. Three sludge samples were also collected from the surface of the north cell and ALS seep area and analyzed for VOCs, semi-VOCs and metals. Four new monitoring wells were installed and sampled. Results of the March 1992 groundwater sampling event indicate off-site VOCs groundwater contamination.

Phase II RI, Autumn 1992

RETEC continued to install groundwater monitoring wells and to sample groundwater during August 1992. Wells MW 14 and PZ 6 were installed approximately 1000 feet downgradient of the site (just east of US Highway 89) to monitor water quality between Mission Wye and Eggar's gravel quarry. Interceptor well MW 13 was also installed 2000 feet to the northeast to monitor groundwater quality upgradient from private wells. A groundwater sample was collected and analyzed from a private well located 4000 feet from the site. Sample results from both wells MW 14 and PZ 6 indicate groundwater contamination east of U.S. Highway 89. Groundwater samples from the interceptor well (MW 13) and a private well (see Well M location on Figure 1) were not contaminated.

Investigative activities have continued. BNRR submitted a groundwater monitoring plan in June 1992. Groundwater monitoring events have been conducted every year since that time (i.e. July/August 1992 event, two in 1993, two in 1994 and one in 1995).

b. Release of Hazardous or Deleterious Substance

The hazardous or deleterious substances detected at the site include chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, tetrachloroethene (PCE), 1,1,1-dichloroethane, trichloroethene (TCE) and total petroleum hydrocarbons (TPH) as well as lubricating oil and oil sludge. The primary contaminants in the clay filter material and groundwater and soil are the VOCs, PCE and TCE. Low concentrations of metals and polycyclic aromatic hydrocarbons (PAHs) exist in various media but these chemicals were not identified in the Revised Risk Assessment (RETEC, March 1993) as chemicals of interest. (See Table 1 for the entire list of these chemicals of interest.)

BNRR has collected groundwater samples at the site from 1991 through May 1995. The July 1994 Groundwater Monitoring Report (September 1994) provides a summary of all groundwater data for 1994. Tables 2, 3, 4 and 5 from the Phase II Report Mission Wye, Montana RI, Volume I (RETEC, revised August 1992) provide a summary of contaminants contained in groundwater, clay filter material, ALS and soil, respectively. PCE and TCE concentrations in groundwater, which fluctuate with seasonal groundwater elevation changes, range from 0.0011 mg/L to 2.2 mg/L. PCE and TCE concentrations in the clay filter

TABLE 1

MISSION WYE CECRA SITE

CHEMICALS OF INTEREST

Chlorobenzene

1,2-Dichlorobenzene

1,4-Dichlorobenzene

1,1-Dichloroethane

cis-1,2-Dichloroethene

trans-1,2-Dichloroethene

Tetrachloroethene

1,1,1-Trichloroethane

Trichloroethene

TOTAL PETROLEUM HYDROCARBONS

TABLE 2

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN GROUNDWATER

ANALYTICAL PARAMETER (ug/l)	E&E, 9/86				RETEC, 2/91					MDHES 2/91 (2)	
	MW1	MW2	MW3	MW4*	MW1	MW2	MW3@	MW4*	Lab Dup MW3	MW3–Split	MCL
VOC											
Tetrachloroethene	<5	<5	2,200	2,000	<0.5	<0.5	5	4.4	4.4	4.5	5
Trichloroethene	<5	27	2,200	2,200	<0.5	<0.5	4.9	4	4.1	<0.5	5
trans–1,2–Dichloroethene	<5	<5	2,100	1,900	<1	<1	<1	<1	<1	<0.5	100
cis–1,2–Dichloroethene	NA	NA	NA	NA	<1	<1	1	<1	1	<0.5	70
1,1,1–Trichloroethane	<5	<5	<5	<5	<0.5	<0.5	0.95	0.83	0.84	<0.5	200
Toluene	<5	<5	<5	<5	<1	<1	<1	<1	<1	2.3	1,000
Xylenes (Total)	<5	<5	<5	<5	<1	<1	<1	<1	<1	0.7	10,000
BNA											
Bis(2–Ethylhexyl)Phthalate	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	NE
Dissolved Metals											
Arsenic	<10	<10	<10	<10	6	7	<5	<5	NA	NA	50
Barium	[44]	[70]	[99]	[101]	<100	<100	<100	<100	NA	81	2,000
Cadmium	<5	<5	<5	<5	<1	<1	2	2	NA	<1	5

1 – Only compounds which were detected are reported on this table. A complete set of RETEC's laboratory reports is presented in the Phase 1 RI report (RETEC, 1991).

2 – MDHES sample number for Well MW3 is BN/LIV MW3. MDHES data is presented for qualitative comparison with BNRR data.

* – MW4 is a duplicate sample of MW3.

@ – State took split of RETEC's MW3.

MCL – 40 CFR Parts 141, 142, and 143. National Primary Drinking Water Regulations.

NE – Not Established.

[ ] – Value is greater than instrument detection limit but less than contract requirements.

NA – Not analyzed.

Analyte present in the sample above the MCL.

TABLE 2 (continued)

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN GROUNDWATER

ANALYTICAL PARAMETER (µg/l)	RETEC 3/92															
	MW1	MW2	MW3	MW3LD	MW30	MW4	MW5	MW6	MW7	MW8	MW9	MW9LD	MW10	MW11	MWFB#	MCL
VOC																
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
1,4-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	10	6.4	<1.0	1.0	<1.0	15	16	<1.0	<1.0	<1.0	70
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Tetrachloroethene	<1.0	<1.0	3.0	3.1	2.8	2.0	30	<1.0	1.5	<1.0	16	13	1.3	<1.0	<1.0	5
1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200
Trichloroethene	<1.0	<1.0	3.0	2.9	2.7	12	13	<1.0	2.2	<1.0	20	19	1.1	<1.0	<1.0	5

1 - Only compounds which were analyzed for and were detected are reported on this table. A complete set of laboratory reports is presented in Appendix L.

LB -MW3LD and MW9LD is a laboratory duplicate sample of MW3 and MW9, respectively.

MW30 is a RETEC duplicate sample of MW3.

MCL - 40 CFR Parts 141, 142, and 143. National Primary Drinking Water Regulations.

- MWFB is a field blank sample. RETEC field blank prepared with de-ionized water.

[ ] Analyte present in the sample above the MCL.

TABLE 2 (continued)

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN GROUNDWATER

ANALYTICAL	*RETEC, 9/91*										*MDHES, 9/91 (2)*				
PARAMETER (ug/l)	MW1	MW2	MW3	MW30*	MWFB#	MW4	MW40	MW5	MW6	MW7	MW3	MW4	MW6	MWFB#	MCL
VOC															
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	5
Chlorobenzene	<1.0	<1.0	2.1	2.2	<1.0	18	17	<1.0	<1.0	<1.0	2.3	<0.5	<0.5	<0.5	NE
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	7.6	7.5	<1.0	<1.0	<1.0	<0.5	11.9	<0.5	<0.5	NE
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	0.6	<0.5	<0.5	NE
1,4-Dichlorobenzene	<0.5	<0.5	<0.5	<0.5	0.5	6	6	<0.5	<0.5	<0.5	<0.5	5.2	<0.5	<0.5	NE
1,1-Dichloroethane	<1.0	<1.0	1.4	1.5	<1.0	2	1.9	<1.0	<1.0	<1.0	2.1	3.1	<0.5	<0.5	NE
trans-1,2-Dichloroethene	<1.0	<1.0	8	8.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	11.3	46.1	<0.5	<0.5	100
cis-1,2-Dichloroethene	<1.0	<1.0	720	740	<1.0	37	37	14	<1.0	39	798	<0.5	<0.5	<0.5	70
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	1.8	<0.5	<0.5	NE
Tetrachloroethene	<0.5	<0.5	380	490	<0.5	4.1	4.2	52	<0.5	22	493	4.1	<0.5	<0.5	5
1,1,1-Trichloroethane	<0.5	<0.5	7.3	7.8	<0.5	3.9	3.8	0.95	0.83	0.84	9.2	4.1	<0.5	<0.5	200
Trichloroethene	<0.5	<0.5	650	730	<0.5	37	37	34	<0.5	46	601	37.5	<0.5	<0.5	5
BNA	NA	NA	NA	NA	NA	<10	<10	<10	NA	NA	NA	NA	NA	NA	
Dissolved Metals	NA	NA	NA	NA	NA				NA	NA	NA	NA	NA	NA	
Barium						100	100	<100							2,000
Iron						420	<30	350							300+
Lead						<10	<10	10							15&
Manganese						270	270	50							50+

1 - Only compounds which were analyzed for and were detected are reported on this table. A complete set of laboratory reports is presented in Appendix L.

2 - MDHES sample numbers for Wells MW3, MW4, and MW6 are 2752-MW-301, 2752-MW-401, and 2752-MW-601, respectively.

MDHES data is presented for qualitative comparison with BNRR data.

* - MW30 and MW40 are duplicate samples of MW3 and MW4.

MCL - 40 CFR Parts 141, 142, and 143. National Primary Drinking Water Regulations.

- MWFB are field blank samples. RETEC field blank prepared with de-ionized water.

NE - Not Established.

NA - Not analyzed.

& - Action level, not MCL.

\+ - Secondary Drinking Water Standard.

[ ] Analyte present in the sample above the MCL.

TABLE 3

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN CLAY WASTE

ANALYTICAL PARAMETERS (mg/kg)	APRIL 1991 ReTeC TP-SL3	ReTeC TP-SL4	ReTeC TP-SL5#	ReTeC GW1 (ug/l)	MDHES Split (1) TP-SL4	MDHES Split (1) SL4-DUP	SEPTEMBER 1991 ReTeC MWSL2	ReTeC MWSL6	ReTeC MWSL7*	MDHES MWSL6
VOC										NA
Chlorobenzene	<1	<1	<1	<50	2.6	2.6	<1	<0.2	<0.2	
2-Chlorotoluene	5.6	340	740	<50	140	140	<1	<0.2	<0.2	
4-Chlorotoluene	<1	<1	71	<50	22.5	22.5	<1	<0.2	<0.2	
1,2-Dichlorobenzene	4.6	4.4	14	220	1.1	1.1	5.6	0.89	0.76	
1,4-Dichlorobenzene	<1	1	1.7	<50	0.4	0.4	<1	<0.2	<0.2	
1,1-Dichloroethene	<1	<1	1.3	<50	<0.5	<1	<1	<0.2	<0.2	
cis-1,2-Dichloroethene	<1	9.2	59	<50	9	9	2.4	0.22	<0.2	
trans-1,2-Dichloroethene	<1	4.1	22	<50	3	3	<1	<0.2	<0.2	
Methylene Chloride	320	<1	<1	<50	<0.5	<0.5	<1	<0.2	<0.2	
Tetrachloroethene	250	17,000	36,000	3,100	44,848	44,848	<1	<0.2	<0.2	
1,1,1-Trichloroethane	5.1	<1	<1	<50	<0.5	<1	<1	<0.2	<0.2	
Trichloroethene	14	400	1,700	22,000	1,417	1,417	1,000	70	96	
Vinyl Chloride	<1	<1	1.4	<50	<0.5	<1	<1	<0.2	<0.2	
Ethylbenzene	6.9	3.9	9.9	<50	2.4	2.4	34	0.55	0.4	
Toluene	22	5.6	18	<50	6.8	6.8	53	2.5	2.3	
Xylenes	58	29	67	84	16.8	16.8	170	4.3	3.7	
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	0.7	NA	NA	NA	
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	2.3	NA	NA	NA	
4-Isopropyltoluene	NA	NA	NA	NA	NA	0.5	NA	NA	NA	
N-Butylbenzene	NA	NA	NA	NA	NA	0.5	NA	NA	NA	
Naphthalene	NA	NA	NA	NA	NA	2	NA	NA	NA	
BNA										NA
Phenol	47	37	15J	<5,000	<1	<1	<20	<20	<20	
2-Methylnaphthalene	NA	NA	NA	NA	38.8	24.2	NA	NA	NA	
Naphthalene	16J	13J	10J	2.6J	7.82	4.7	47	12J	<20	
Fluorene	6J	8J	9J	1J	9.13	5.65	11J	5J	2J	
Phenanthrene	55	50	<36	7.1	29.7	18.3	49	<20	13J	
Anthracene	<20	<20	4J	1.8J	<1	<1	3J	<20	<20	
Fluoranthene	<20	<20	3J	1.6J	8.91	6.58	7J	5J	<20	
Pyrene	8J	14J	16J	1.8J	6.87	4.99	8J	11J	4J	

TABLE 3 (Continued)

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN CLAY WASTE

ANALYTICAL PARAMETERS	APRIL 1991 TP-SL3 GW	TP-SL3	TP-SL4	TP-SL5	GW1 (ug/l)	MDHES Split TP-SL4+ (1)	SEPTEMBER 1991 MWSL2	MWSL6	MWSL7*	MDHES MWSL6 (2)	TCLP Reg. Limit
Total Metals (mg/kg)	NA										
Antimony		<5	<5	5	<50	<8	<5	<5	<5	70.5	
Arsenic		<10	11	15	33	1-2	<25	28	<25	12.3	
Barium		45	46	69	<100	45-81	<25	49	<25	299	
Cadmium		1	5	9	35	<1	<5	<5	<5	8.3	
Chromium		33	55	78	1,190	33-51	140	250	220	212	
Copper		180	440	9,650	430	153-307	200	710	560	1,290	
Iron		4,550	28,200	63,700	157,000	7,710-11,800	14,200	27,000	11,400	54,900	
Lead		150	510	1,080	110	104-153	160	750	570	143	
Manganese		24	160	230	127,000	114-158	120	250	280	312	
Mercury		2	3	5	<1	<0.04	<5	<5	<5	<0.04	
Molybdenum		<5	5	26	<5	<20.1	<25	<25	<25	<17.5	
Selenium		<10	<10	<10	<5	<16	<25	<25	<25	0.9	
Silver		<5	<5	5	10	<2	<25	<25	<25	<2	
Zinc		36	300	540	5,460	58-116	260	360	400	52.7	
TCLP Procedure (mg/l)						NA					
cis-1,2-Dichloroethylene	0.011	<0.01	0.37	0.48			0.59	<0.01	<0.01	0.025	None
trans-1,2-Dichloroethylene	<0.010	<0.01	0.27	0.28			<0.01	<0.01	<0.01	<0.005	None
Tetrachloroethylene	0.2	0.16	41	46			0.024	<0.01	<0.01	6.7	0.7
Trichloroethylene	1.1	0.86	6.19	7.1			18	0.18	0.36	0.417	0.5
Vinyl Chloride	<0.010	<0.01	<0.010	0.014			<0.01	<0.01	<0.01	<0.005	0.2
Chromium	0.8	1.1	<0.5	3			1.7	<0.5	<0.5	1.2	5.0
Lead	0.7	1.1	2.6	<0.5			<0.5	<0.5	<0.5	0.73	5.0
Soil Properties	NA				NA	NA				NA	
pH		1.7	3.0	3.2			1.2	1.6	3.9		
BTU/lb		8,370	7,710	4,350			7,670	8,130	5,960		
Water Properties	NA	NA	NA	NA			NA	NA	NA	NA	
TPH					8,800,000						
Oil & grease					7,300,000						

\+ - Several replicates of this sample were digested seperately; the oily nature of the materials made it difficult to obtain representative samples for digestion, resulting in wide spread results for some parameters.

1 - MDHES sample number 2752-SL-2.

2 - MDHES sample number 2752-SL-2.

\# - TP-SL5 is duplicate sample of TP-SL4.

* - MWSL7 is a duplicate sample of MWSL6.

J - Estimated value, MS indicates compound present at ID criteria, but result is less than sample quantification limit, but greater than zero.

TP-SL3GW - TCLP analysis using groundwater collected from Well MW1.

MDHES data is presented for qualitative comparison with HNRR data.

NA - Not analyzed.

NR - Not reported.

Sample failed TCLP for this analyte.

TABLE 4

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN ALS

March 1992

ANALYTICAL PARAMETERS	NWC SURFACE A	NWC SURFACE B	NORTH PARKING LOT	MDHES SPLIT(2) NWC SURFACE A	MDHES SPLIT(2) NORTH PARKING LOT
VOC (mg/kg)				NR	NR
Methylene chloride	0.66	0.38	<0.20		
Trichloroethene	9.1	10	3.0		
Xylenes	<0.20	0.35	<0.20		
BNA (mg/kg)					
Phenol	47 J	<100	<100	<1	<1
2-Methylnaphthalene	<100	13 J	<100	<1	<1
Phenanthrene	24 J	55 J	38 J	<1	<1
Bis(2-ethylhexyl)Phthalate	38 J	<100	8 J	<11	<11
METALS (mg/kg)					
Antimony	2	2	3	NA	NA
Barium	28	24	56	109	194
Chromium	89	75	54	NA	NA
Copper	68	75	39	71.6	55.3
Iron	460	630	500	NA	NA
Lead	51	83	90	44.5	72.8
Manganese	5	6	4	NA	NA
Zinc	82	88	37	NA	NA

1 – Only compounds which were analyzed for and were detected are reported on this table.
A complete set of laboratory reports is presented in Appendix F.

2 – MDHES sample numbers 2752-SL-3 and 2752-SL-4, NWC surface A and North Parking Lot, respectively.
MDHES data is presented for qualitative comparison with BNRR data.

NWC – North Waste Cell

NR – Not analyzed due to laboratory equipment breakdown.

NA – Not analyzed or not reported.

J – Estimated value, MS indicates compound present at ID criteria, result is less than sample quantification limit, but greater than zero.

TABLE 5

MISSION WYE CECRA SITE

SUMMARY OF CONTAMINANTS IN SOIL UNDER WASTES

September 1991

ANALYTICAL PARAMETERS	TP-South	TP-East	MDHES Split (2) TP-East
VOC (mg/kg)			
2-Chlorotoluene	<0.02	11	8.7
4-Chlorotoluene	<0.02	1	0.8
1,2-Dichlorobenzene	19	<0.2	0.1
1,3-Dichlorobenzene	0.25	<0.2	<0.5
1,4-Dichlorobenzene	3.2	<0.2	<0.5
cis-1,2-Dichloroethene	<0.02	1.1	0.2
Tetrachloroethene	3.2	950	467
1,1,1-Trichloroethane	0.24	<0.2	<0.5
Trichloroethene	8.4	<0.2	13.7
Ethylbenzene	0.057	0.23	0.2
Toluene	0.045	<0.2	<0.5
Xylenes	0.26	1.3	0.9
BNA (mg/kg)			
1,2-Dichlorobenzene	8.6	0.29J	<1
1,4-Dichlorobenzene	2.2	<0.66	<1
1,2,4-Trichlorobenzene	1	<0.66	<1
Naphthalene	0.82	0.71	<1
Fluorene	0.54J	0.81	<1
Phenanthrene	2.8	3.7	<1
Anthracene	<0.66	0.31J	<1
Di-n-Butylphthalate	<0.66	0.41J	<1
Fluoranthene	0.21J	0.98	<1
Pyrene	0.51J	3.7	<1
Butylbenzylphthalate	<0.66	0.36J	<2
Benzo(a)Anthracene	<0.66	0.25J	NA
Chrysene	<0.66	0.58J	<2
bis(2-ethylhexyl)Phthalate	0.93	1.8	<11

ANALYTICAL PARAMETERS	TP-South	TP-East	MDHES Split (2) TP-East	
Total Metals (mg/kg)			NA	
Arsenic	<5	7		
Barium	110	120		
Chromium	34	29		
Copper	14	230		
Iron	13,260	14,870		
Lead	8	220		
Manganese	240	230		
Zinc	59	73		*TCLP Reg. Limit*
TCLP Procedure (mg/l)				
cis-1,2-Dichloroethylene	<0.01	0.013	0.798	None
Tetrachloroethylene	0.05	15	0.493	0.7
Trichloroethylene	0.18	1.1	0.601	0.5
Soil Properties			NA	
pH	5.4	6		
BTU/lb	Non-Ignitable	Non-Ignitable		

1 - Only compounds which were analyzed for and were detected are reported on this table.
A complete set of laboratory reports is presented in Appendix E.

2 - MDHES sample number 2752-TP-E1.

J- Estimated value, MS indicates compound present at ID criteria, but result is less than sample quantification limit, but greater than zero.

☐ Sample failed TCLP for this analyte.

NA - Not analyzed.

MDHES data is presented for qualitative comparison with BNRR data.

material range from 14 mg/kg to 36,000 mg/kg. The clay source material exhibits the hazardous characteristic of toxicity and has a pH below 2. PCE and TCE concentrations in the ALS material range from 5.4 mg/kg to about 140 mg/kg (according to the Excavation and Material Handling Study, Mission Wye, Montana (RETEC, February 1994)) and also has a pH below 2. PCE and TCE concentrations in soil underneath waste cells range from 3.2 mg/kg to 950 mg/kg. More recent information for source material is available in the Excavation and Material Handling Study.

The Phase II RI Report (RETEC, revised August 1992) also describes hydrogeological characteristics at the site: groundwater flows from southwest to northeast across the site at between 2 and 10 feet/day, the aquifer thickness is approximately 40 feet with an effective porosity of 0.15 to 0.25 and, the hydraulic gradient is 0.003 feet.

Figure 2 shows the location of the groundwater plume at Mission Wye. Additional well installations and monitoring data after 1992 indicate the groundwater plume extends to the gravel quarry located to the northeast. Except for interceptor well MW 13, no groundwater monitoring has occurred east of the quarry; consequently, the leading edge of the groundwater plume has not been identified.

Materials disposed in the three unlined cells, are a source of groundwater contamination. Hazardous substances migrate from the waste through a shallow soil unit to groundwater. During high groundwater elevations, water enters the bottom of the north cell which causes a slug release of VOCs to the aquifer. Excavating and treating the source material in the cells will greatly reduce or eliminate groundwater contamination.

1. Waste Volume Estimates, Location of Cells and Source Characterization

Figure 3 shows the location of the north, south and east cells and the ALS area. Figures 4, 5, and 6 show cross-sections of the south, north and east cells, respectively. These figures are from the RETEC Excavation and Materials Handling Study.

Two zones of material requiring treatment exist at each cell. The zone of clay filter material and visually contaminated soil will be excavated and treated using thermal desorption. The zone of residually contaminated soil beneath the clay filter material (except for two feet of soil below the clay filter material in the east cell) will be left in place and treated using Soil Vapor Extraction (SVE).

The north cell measures approximately 195 feet by 50 feet. The depth from the surface to the bottom of the cell ranges from 10 to 12 feet; 6 to 8 feet of overburden soil covers the clay filter material. The thickness of this material is not uniform. The maximum thickness of clay filter material in this cell is six feet. About 1500 cubic yards of clay source material is contained in this cell. Approximately 2775 cubic yards of contaminated soil, which will require treatment by SVE, is under the source material. This assumes a maximum of 5 to 8 feet of chlorinated-stained soils will require treatment.

FIGURE 3

MISSION WYE CECRA SITE

LOCATION OF WASTE CELLS

EXPLANATION

ETP-25 EXPLORATION TEST PIT

ATP-10 ANOMALY TEST PIT

EXCAVATION AREA

ALS AREA

NORTH CELL

SOUTH CELL

EAST CELL

ETP-1 ETP-2A ETP-4 ETP-5 ETP-6 ETP-18 ETP-19 ETP-24 ETP-25 ETP-27

MWSL1 MWSL2 MWSL6 ATP-10

EXCAVATION AREA 1

EXCAVATION AREA 2

EXCAVATION AREA

A A' B B' C C'

4405 4410 4415

0 30 60 120

SCALE IN FEET

B.N.R.R. – MISSION WYE, MT
TREATABILITY STUDY
3-0053-220

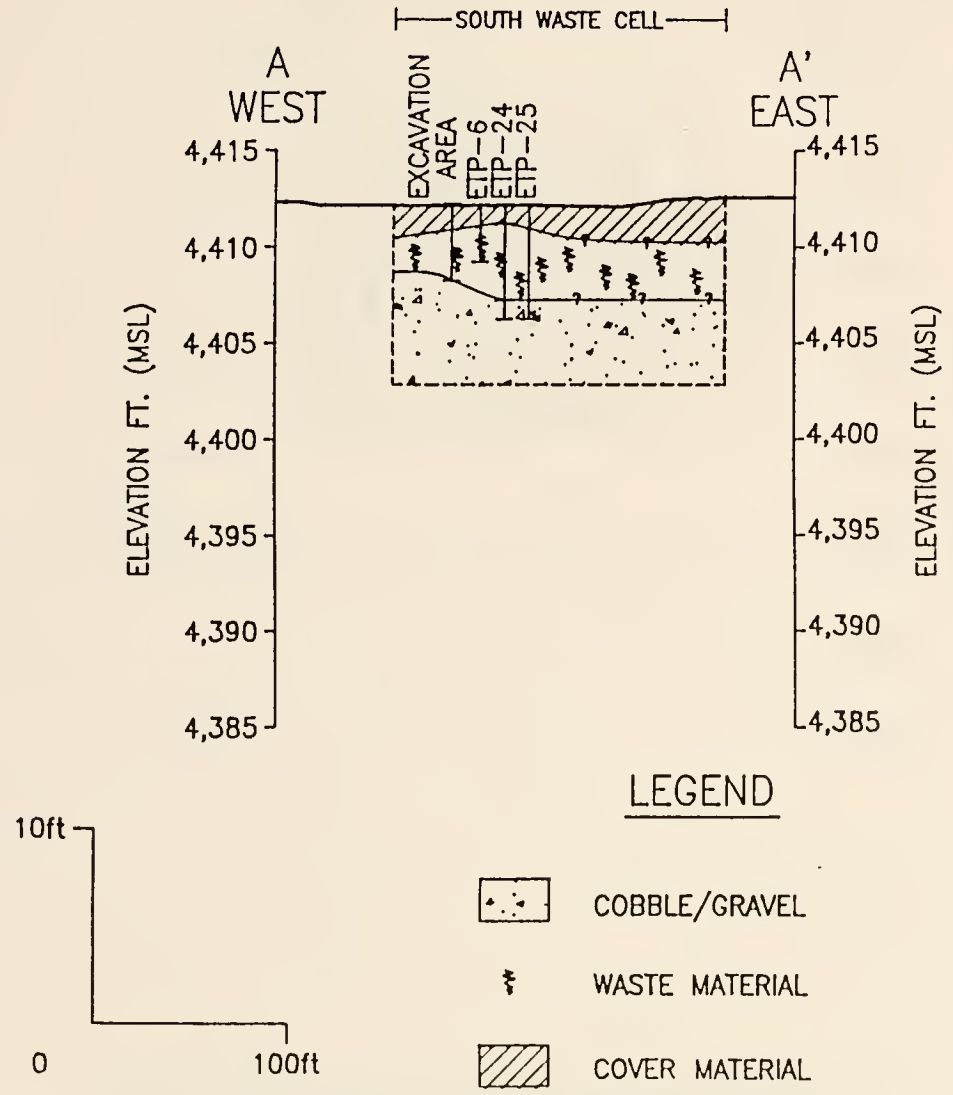
CROSS SECTION LOCATIONS

RETEC

FIGURE 4

MISSION WYE CECRA SITE

CROSS SECTION OF SOUTH WASTE CELL



SOUTHCEL.DWG
DATE: 12/22/93

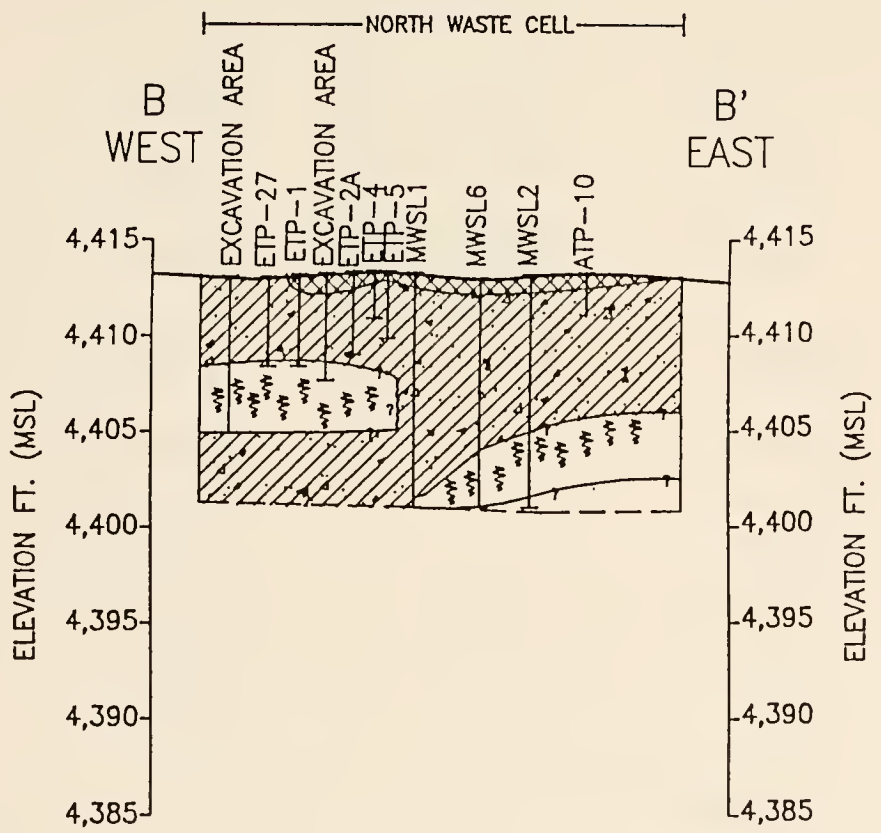
CROSS SECTION LOCATIONS ARE SHOWN ON FIGURE 2-31

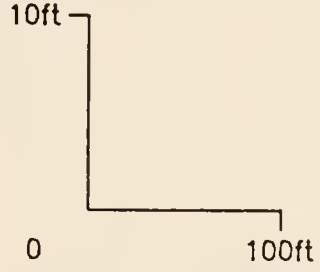
B.N.R.R. – MISSION WYE, MT
TREATABILITY STUDY
CROSS SECTION A–A'

FIG[illegible] 5

MISSION WYE CECRA SITE

CROSS SECTION OF NORTH WASTE CELL





LEGEND

- ALS MATERIAL
- COBBLE/GRAVEL
- WASTE MATERIAL
- COVER MATERIAL

NORTHCEL.DWG
DATE: 12/22/93

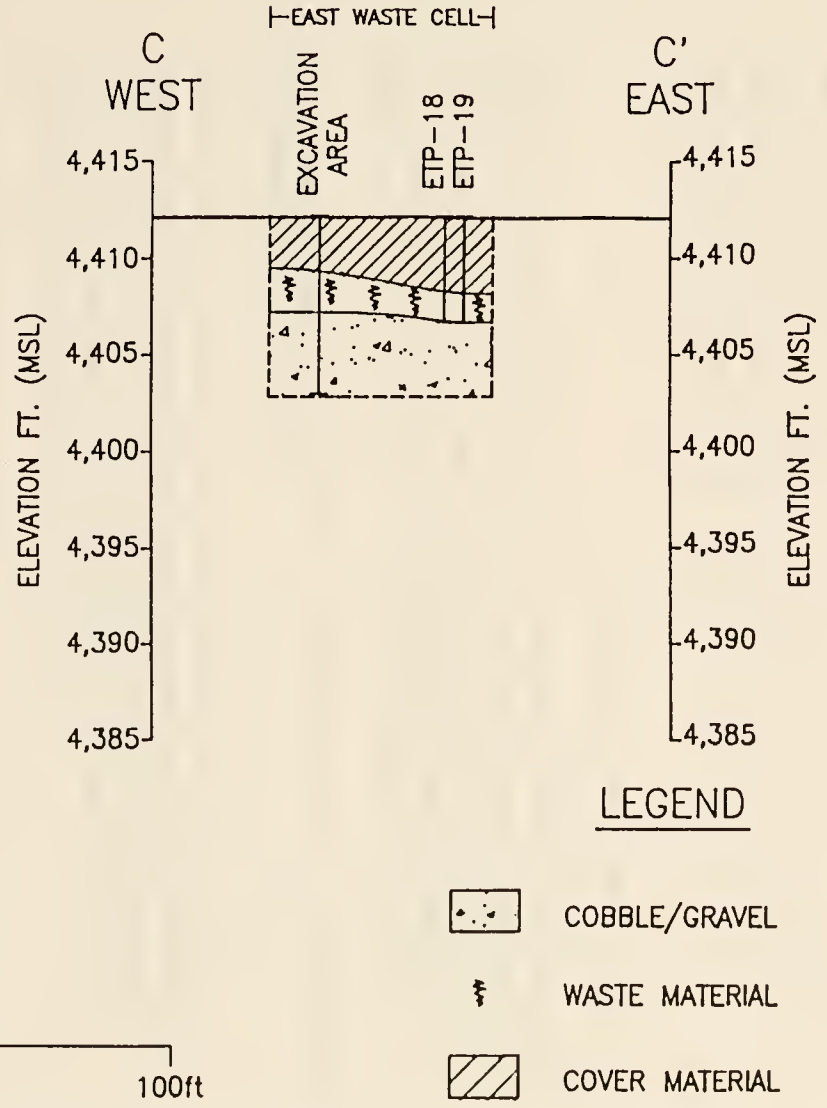
CROSS SECTION LOCATIONS ARE SHOWN ON FIGURE 2-31

B.N.R.R. – MISSION WYE, MT
TREATABILITY STUDY
CROSS SECTION B–B'

FIGURE 6

MISSION WYE CECRA SITE

CROSS SECTION OF EAST WASTE CELL



EASTCELL.DWG
DATE: 12/22/93

CROSS SECTION LOCATIONS ARE SHOWN ON FIGURE 2-31

B.N.R.R. – MISSION WYE, MT
TREATABILITY STUDY
CROSS SECTION C–C'

The east cell is approximately 120 feet by 50 feet. The depth from the surface to the bottom of the cell is 10 feet. Two to 3 feet of overburden soil covers the pit. The maximum thickness of the source material is five feet. About 680 cubic yards of clay source material are contained in this cell. Approximately 1323 cubic yards of contaminated soil, which will require SVE treatment, is under the clay filter material. This assumes a maximum of 3 feet of chlorinated-stained soils will require treatment. Approximately 2 feet of contaminated soil under the east cell will be excavated and treated using thermal desorption.

The south cell is approximately 175 feet by 55 feet. The depth from the surface to the bottom of the cell is 10 feet. Two to 3 feet of overburden soil covers the pit. The thickness of the source material is 5 feet. About 1250 cubic yards of clay source material are contained in this pit. Approximately 2200 cubic yards of contaminated soil, which will require SVE treatment, is under the clay filter material. This assumes a maximum of 5 feet of chlorinated-stained soils will require treatment.

2. Total Estimated Source Material Volumes

Table 6 lists the total estimated volume of clay filter material. Approximately 3400 cubic yards of acid-clay filter source material is buried in the three cells. The estimated volume of contaminated soil beneath cells, which will require SVE treatment, is 6298 cubic yards. The estimated volume of the ALS material and seep area contaminated soils is approximately 3527 cubic yards.

The estimated volume of waste debris, including glass, hoses, railroad ties and scrap metal is 920 cubic yards.

The total estimated volume of clay source material, ALS and seep area contaminated soil requiring thermal desorption treatment is approximately 6957 cubic yards (9,000 tons). The total estimated volume of soil requiring soil vapor extraction treatment is 6,298 cubic yards. The total volume of all materials requiring treatment is 13,255 cubic yards.

B. Other Actions to Date

1. Previous Actions

The site was fenced in 1978 to prevent access. No other removal actions have been taken by Burlington Northern Railroad, Park County, the State of Montana or EPA.

TABLE 6

MISSION WYE CECRA SITE

ESTIMATED VOLUME OF MATERIALS REQUIRING TREATMENT
(Cubic Yards)

WASTE	VOLUME
Clay Filter Material	
North Cell	1500
East Cell	680
South Cell	1250
Subtotal	3430
Soil Under Cells	
North Cell	2775
East Cell	1323
South Cell	2200
Subtotal	6298
Asphalt-like Substance (ALS)	527
Seep Area Contaminated Soils	3000
Subtotal	3527
Grand Total	13,255

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

A. Threats to Public Health or Welfare

The Revised Risk Assessment, was prepared by Burlington Northern Railroad's consultant RETEC and reviewed, revised and approved by DHES. The executive summary for the risk assessment is paraphrased below:

> The proposed future use for the site is to close the landfill; no future residential use is planned. Except for an occasional on-site visitor, there are no current receptors at or near the site. The possibility for on-site visitors is low because the site is fenced and away from populated areas. Tetrachloroethene, trichloroethene and cis-1,2-dichloroethene exceed drinking water maximum contaminant levels on a seasonal basis.
>
> Quantitative estimates of risk were made by combining chemical intakes with the quantitative indices of toxicity to estimate potential human health effects. For exposures to chemicals of interest, three different health effects were considered: carcinogenic effects and chronic and sub-chronic non-carcinogenic effects.
>
> The primary human exposure pathways include ingestion of groundwater, inhalation of volatile solvents during showering and dermal contact. Residents who live downgradient of the site and use groundwater are subject to the greatest potential future risk. Trespassers who enter the site may be exposed to surface contamination through the skin.
>
> Based on future potential exposure, the carcinogenic risk for adult residents for ingestion of groundwater near the site is 1.35×10^{-4}. The total carcinogenic risk for adult residents near the site for all exposures is 2.1×10^{-4}. Table 7 summarizes the total future potential carcinogenic risks for exposure pathways at and near the Mission Wye site.

The aquifer at Mission Wye is considered a drinking water aquifer. The primary health threat to the public is that groundwater contaminants may migrate to private drinking wells located downgradient from the site. PCE and TCE are the primary chemicals of interest and have been detected in groundwater underneath and downgradient from the site (see Table 2 for a Summary of all Contaminants in Groundwater). Removal and treatment of the source at the Mission Wye site should to eliminate the potential for these wells to become contaminated in the future.

TABLE 7

MISSION WYE CECRA SITE

SUMMARY OF TOTAL CARCINOGENIC RISKS
(from all exposure pathways)

RECEPTOR	RISK
On-site Visitors Adult	8.55E-10
On-site Visitors Age 6-15 Years	3.83E-08
On-site Visitors Age 1-6 Years	1.19E-08
Adult Residents Near Site	2.11E-04
Young Children Near Site	9.90E-05

Table 8 shows the EPA Carcinogenic Classification for chemicals of interest. The two primary chemicals of interest, PCE and TCE, are classified as probable human carcinogens. These chemicals typically affect the central nervous system, kidney and liver. Other health effects may occur from chronic or acute exposure to these compounds.

B. Threats to the Environment

The Ecological Assessment from the Revised Risk Assessment is summarized below:

> Potential ecological receptors for Mission Wye and surrounding area have been identified through the ecological assessment completed as part of the Revised Risk Assessment (ReTec 1993). Potential ecological receptors consist primarily of terrestrial species since aquatic habitats are not found on or near the site. Due to the environmental setting and degree of disturbance, the site is not expected to provide quality habitat for wildlife species. No rare, threatened or endangered species were observed, and no habitats of special concern are associated with the site.
>
> The area could provide marginal habitat for selected wildlife species including passerine bird species and small mammals. A fox den has been observed near the site. Species which might frequent the area include sparrows, starlings, blackbirds, magpies; mammals such as raccoons, skunks, rabbits, prairie dogs, mice and ground squirrels; and a few amphibian and reptile species.
>
> The potential exposure routes for ecological receptors may include incidental ingestion of contaminated soil and dermal contact with surficial contaminated media. However, impacts to the ecology of the region are expected to be low. Toxic effects from exposure would probably only occur for species with frequent contact with the ALS material because it has a pH of less than 2.0. The low pH of the material does provide a physical hazard to species from direct contact and would probably be of most concern for ecological effects.

TABLE 8

MISSION WYE CECRA SITE

CARCINOGEN CLASSIFICATION FOR CHEMICALS OF INTEREST

Chemical of Interest	Carcinogen Classification
Chlorobenzene	D
1,2-Dichlorobenzene	D
1,4-Dichlorobenzene	C
1,1-Dichloroethane	C
cis-1,2-Dichloroethene	D
trans-1,2-Dichloroethene	NA
Tetrachloroethene	B2
1,1,1-Trichloroethane	D
Trichloroethene	B2

- Group A - Human Carcinogen
- Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in experimental animals with inadequate or lack of evidence in humans)
- Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in experimental animals or lack of human data)
- Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)
- Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies)

IV. ENDANGERMENT DETERMINATION

As set forth above, there has been a release or there is a substantial threat of a release of hazardous or deleterious substances into the environment that may present an imminent and substantial endangerment to public health, welfare, or safety or the environment.

V. REMEDIATION GOALS

A. Groundwater

Groundwater remediation goals for this site originally cited the maximum contaminant level (MCL) for chemicals of interest (see DHES Revised Mission Wye remediation goals letter to RETEC dated September 16, 1993). Subsequently, new cleanup standards for surface and groundwater were adopted by DHES. These standards are specified in Montana Numeric Water Quality Standards, Circular WQB-7, July 15, 1994, as modified by Senate Bill 331. For all except one chemical at the Mission Wye site, the new WQB-7 standards and MCL standards are equivalent. The WQB-7 standards and the MCLs are listed in Table 9.[1]

B. Soil

A leaching model using site specific parameters calculated soil cleanup levels that would assure nonexceedances of groundwater environmental requirements, criteria, or limitations (ERCLs). The calculated soil remediation goals were established based on MCLs. (The WQB-7 standards were not available until after the modeling was completed.) [Mathematical Model For Calculating Soil Clean-up Criteria Based on Leaching to Groundwater (RETEC undated)]. The calculated soil remediation goals are listed in Table 9.

The second category of soil remediation goals presented in Table 9 are the treatment levels for the Land Disposal Restrictions (LDRs) described in the Identification and Description of Legal Requirements (Appendix A). LDRs promulgated pursuant to RCRA place specific restrictions on concentration levels of RCRA hazardous wastes prior to land disposal. LDRs for chemical constituents at Mission Wye are listed in Table 9. For soil, the lowest cleanup number for each chemical of interest is the applicable remediation goal, to ensure compliance with the more stringent of the applicable or relevant and appropriate requirements set forth in Appendix A. The final soil remediation goal for each of the chemicals of interest is shown in the last column of Table 9.

Table 9 also sets forth the total petroleum hydrocarbon (TPH) remediation goals for soil. The TPH remediation goals were calculated based on soil cleanup levels that would assure nonexceedances of groundwater ERCLs. These levels will ensure that leachate from treated clay material and treated soil will not migrate to groundwater and cause exceedances of groundwater narrative standards. [see Evaluation of TPH Cleanup Levels for Clay Wastes at the BNRR Mission Wye Site (GeoTrans, Inc. November 1994)].

---

[1] Senate Bill 331, passed by the 1995 Montana legislature, requires revision of Circular WQB-7 water quality standards for carcinogens. The Senate Bill requires WQB-7 standards to reflect a 1×10^{-5} for carcinogens (other than arsenic) or the MCL, whichever is more stringent. However, since chlorobenzene is not classified as a carcinogen, the standard for chlorobenzene did not change and remains as cited in the July 15, 1994 version of Circular WQB-7.

TABLE 9

MISSION WYE CECRA SITE

REMEDIATION GOALS

CHEMICAL	Groundwater 1995 WQB-7 Standard µg/L	Groundwater MCL µg/L	Soil 1995 LDR mg/Kg	Soil Calculated Remediation Goal mg/Kg	Soil Final Remediation Goal mg/Kg
Chlorobenzene	20	NA	6	NA	6
1,2-Dichlorobenzene	600	600	6	306	6
1,4-Dichlorobenzene	75	75	6	38	6
1,1-Dichloroethane	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	70	NA	3	3
trans-1,2-Dichloroethene	100	100	30	5	30
Tetrachloroethene	5	5	6	7	6
1,1,1-Trichloroethane	200	200	6	14	6
Trichloroethene	5	5	6	0.3	0.3
Total Petroleum Hydrocarbon (TPH)	NA	NA	NA	NA	5000

VI. ALTERNATIVES CONSIDERED

Twelve alternatives, listed on Table 10, were considered for source treatment at the Mission Wye site. These alternatives were compared with each other and evaluated based on three criteria: effectiveness, implementability and cost. The effectiveness criterion insures that an alternative will protect public health and the environment. The implementability criterion measures both the technical and administrative feasibility of constructing and operating the interim source control measure. The cost criterion is based on 1992 present worth costs and is sometimes difficult to estimate with great accuracy because uncertainties associated with the cleanup often remain. The focus should be to make comparative estimates with relative accuracy.

Four documents provide a discussion and comparison of the twelve alternatives: 1) Alternatives Evaluation Report for Source Control Measures, Mission Wye, Montana (RETEC, July 1992); 2) Addendum to Alternatives Evaluation Report for Source Control Measures, Mission Wye, Montana (RETEC, November 1992); 3) Detailed Analysis of Alternatives For Source Control Measures, Mission Wye, Montana (RETEC, January 1993); and 4) Chicago Chemical Consultants Corporation (CCCC) Laboratory Treatability Study Report (July 1994). The third document provides a more detailed comparison of alternatives 8 through 12. The information contained in these documents describe the twelve alternatives considered in this interim action memorandum for the Mission Wye site.

A layer of perched water is located over the north cell and a portion of the south cell. The hydraulic connection between the perched water and the aquifer is not fully understood. Removal and treatment of the perched water is common to all alternatives, except for the no action alternative and is necessary before any response action is taken.

A. Alternatives 1 through 12

Alternative 1: No Action

Alternative 1 provides a baseline against which other alternatives are compared. No cleanup is considered under this response action; the source and soil would be left intact on site. Groundwater monitoring would continue to observe whether contaminant concentrations change over time.

This alternative is not recommended since it is not protective of public health and the environment and would not reduce the mobility, toxicity or volume of the source material. No technical or institutional obstacles are present which would impact the immediate implementation of the no action response. The estimated 1992 cost for this alternative involving groundwater quality monitoring is $65,000.

TABLE 10

MISSION WYE CECRA SITE

COMPARISON OF ALTERNATIVES BASED ON EFFECTIVENESS, IMPLEMENTABILITY AND COST

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST
1) No Action	Poor	Good	Low
2) Capping/Hydraulic Control	Poor	Good	Low
3) Capping/Soil Venting	Poor	Good	Low
4) Capping/Bioventing	Poor	Good	Moderate
5) Excavation/Surface Biological Treatment	Poor	Fair	Moderate
6) Excavation/Chemical Fixation	Fair	Fair	Moderate
7) Excavation/On-site Engineered Land Disposal	Fair	Good	Moderate
8) Excavation/Chemical Fixation/On-site Backfill	Fair	Fair	Moderate
9) Excavation/Chemical Fixation/Off-site Landfill	Fair	Fair	Moderate
10) Excavation/Off-site Hazardous Waste Landfill	Fair	Good	High
11) Excavation/Off-site Incineration	Good	Good	Very High
12) Excavation/ Thermal Desorption, On-site Backfill	Good	Good	Moderate

Alternative 2: Capping/Hydraulic Control

Installation of a hydraulic control system would prevent groundwater from rising above a pre-determined elevation (into the source cells). The groundwater hydraulic control system would consist of a subsurface drain located upgradient of the impacted media. The subsurface drain would collect clean groundwater and divert it by gravity flow around the impacted media to a downgradient surface discharge location. An impermeable cap would be installed to contain the source and prevent water infiltration and chemicals from leaching to groundwater. The ALS material would be relocated in an area covered with the cap. The source contained in the unlined cells would be covered with 6 inches of earth material and a liner and 18 inches of soil for reseeding.

This alternative would not provide overall protection of public health and the environment and would not reduce the mobility, toxicity or volume of the source material. However, the cap would prevent groundwater infiltration and the hydraulic control system may prevent groundwater from contacting the source material. Implementability for this option is possible because caps are a proven technology. Hydraulic control systems are relatively simple to install and the required construction methods of trenching and pipe installation are commonly implemented at other construction projects. The estimated 1992 cost for this interim action is $575,946.

Alternative 3: Capping/Soil Venting

Sixteen vent wells would comprise a soil venting system which would remove VOCs from the subsurface through vacuum wells. The venting system includes a vacuum pump, valves, meters and fittings to monitor and control flow rates, vacuum pressure and influent air concentrations. The soil venting system would be enhanced by implementing an innovative technology called pneumatic fracturing. The cap described in alternative 2 would be installed and groundwater monitoring would continue.

This alternative is not effective because it is difficult to place a vacuum on impermeable clay. In addition, successful pneumatic fracturing of clay is not well-documented. Caps and soil venting systems are implementable and commonly installed throughout the country. Soil venting is well demonstrated in porous soil and materials and equipment to complete the work are readily available. The estimated 1992 cost for this option is $919,057.

Alternative 4: Capping/Bioventing

This response is similar to Alternative 3 except that, with some modifications, bioventing enhanced by pneumatic fracturing would be implemented instead of soil venting. Bioventing injects air into a medium to increase available oxygen. A final cap would be installed and groundwater monitoring would continue to evaluate groundwater changes following interim source control actions.

This technology is not recommended for the same reason soil venting is not effective; it is difficult to either extract air or inject air in clay. Like alternative 3, this system could be easily implemented because the materials and equipment are readily available. The 1992 cost for this response is about $931,032.

Alternative 5: Excavation/Surface Biological Treatment

Alternative 5 would excavate impacted materials and treat them in a surface biological treatment facility. The treatment facility would cover an area of about one acre and be lined with a high-density polyethylene liner. Treatment would take about one year and progress in such a manner that treated material from one lift would be used as backfill in the excavation produced from the subsequent lift. Material from the last lift would be spread over the area of the old waste cells and be revegetated. Groundwater monitoring would continue.

This alternative would enhance volatilization of contaminants during excavation and treatment, but would do little to biologically degrade these contaminants. It is well-documented that biological degradation of PCE occurs in an anaerobic environment. The low pH of the material would also be toxic to microorganisms. This technology is commonly implemented for non-chlorinated VOCs. Surface treatment units are not difficult to construct and operate. The 1992 estimated cost for this alternative is approximately $1,103,937.

Alternative 6: Excavation/Chemical Fixation

Chemical fixation of source material would include pH neutralization and immobilization of organic compounds through chemical fixation so the source would pass the toxicity characteristic leaching procedure test. Once the material is treated and replaced in the excavation, the site would be covered with clean soil and revegetated, but no cap would be installed. Runoff would be directed away from the revegetated area. Groundwater monitoring would continue.

Although several companies have developed effective short-term chemical fixation technologies for inorganic metals, the long-term effectiveness of chemical fixation of organic constituents is not well-documented. The potential exists that "fixed" constituents may be released to the environment due to deterioration of the chemical fixing agent. The reduction of long-term source material mobility is questionable. Implementability of chemical fixation for inorganic contaminants is well. This technology would not meet LDRs for chemicals of concern. The 1992 estimated cost for this option is $1,428,666.

Alternative 7: Excavation/On-site Engineered Land Disposal

Impacted materials would be excavated and placed in an on-site engineered land disposal unit. The disposal unit would consist of an 80 millimeter high density polyethylene liner, soil

venting piping, geosynthetic netting, waste, fill soil, 60 millimeter high density polyethylene liner, top soil and vegetation. Groundwater monitoring would continue.

This action would be effective in containing and reducing the mobility of the source material and future potential risks associated with the site, but would not satisfy the statutory preference for reducing the toxicity and volume of waste. This treatment method would also not meet LDRs established for this site. This technology is well-demonstrated and the materials and equipment to complete the work are readily available. The 1992 estimated cost for this alternative is $1,375,841.

Alternative 8: Excavation, Chemical Fixation, On-Site Backfill

Following perched water removal and treatment, clay source material, debris and surrounding impacted earth material is excavated and treated using a chemical fixation process, aerated to strip additional VOCs and then replaced in the excavation. Debris and oversized material would be steam cleaned.

The agent used in the chemical fixation process is specially formulated calcium oxide. Hydrocarbons are adsorbed onto the lime molecules and become trapped with the calcium hydroxide, which further reacts with carbon dioxide in air to form calcium carbonate. After treatment, the material would be placed into a covered stockpile for further VOCs removal by soil venting. After venting, the material would be tested for leaching potential and pH prior to placement in the excavation.

An engineered land disposal unit would not be required because the treatment process produces a crust of calcium carbonate which encapsulates contaminants and prevents leaching. The excavated area would be covered with six inches of soil and revegetated.

This alternative would not meet LDRs. It is difficult to conclude whether groundwater standards would be achieved through this alternative because it is unknown if residual contaminants would leach out of the treated material, migrate to groundwater and exceed the standards. The 1992 estimated cost for this alternative is $2,332,974.

Alternative 9: Excavation, Chemical Fixation and Off-Site Landfill

This alternative is similar to alternative 8, except the "chemically fixed" source material would be shipped to a solid waste facility in Great Falls, Montana. Approximately 13,953 tons of material would require at least 634 trips for a total of 126,845 loaded miles. Overburden and additional clean soil would be replaced in the excavation. Six inches of soil cover would be spread out over the clean soil and revegetated. By combining soil venting with this alternative, it is expected cleanup standards for soil and groundwater would be met. A groundwater monitoring plan would need to be implemented to document that cleanup standards are achieved.

This alternative would not meet LDRs and other applicable hazardous waste requirements. This alternative does provide some reduction of toxicity, but it may not offer a long-term permanent solution for reducing mobility. The 1992 estimated cost for this project is $3,212,704.

Alternative 10: Excavation, Off-Site Disposal in a Hazardous Waste Landfill

This alternative specifies excavation of clay source material, debris and grossly contaminated soil and shipment to a hazardous waste landfill. Debris and oversized material would not be cleaned but directly disposed in the landfill. The source material would be neutralized before shipment and transported in 22 ton loads to the Envirosafe hazardous waste landfill in Boise, Idaho, a distance of approximately 560 miles. A total of 13,431 tons of material would require at least 610 trips for a total of 341,880 loaded miles. The excavation would be filled with clean soil and revegetated.

This alternative would not meet LDRs. Control or reduction of potential leaching of contaminants to groundwater would be provided by shipping the materials to a permitted landfill. The source material will be isolated from the groundwater by barriers and leachate collection systems.

Removal activities would permanently isolate the source material from groundwater. The long-term effectiveness would depend on the reliability of the hazardous waste landfill cap and liner in preventing direct contact with the source material and in preventing contact of water with the source material. The alternative does not provide a reduction in toxicity or volume other than pH adjustment and does not meet applicable and well-suited environmental requirements, criteria, or limitations.

The mobility of the source material would be reduced by placing it in an engineered landfill. The project could be completed in a short amount of time. The 1992 estimated cost for this alternative is $4,244,006.

Alternative 11: Excavation, Off-site Incineration

This alternative specifies excavation of the source material and transportation to an off-site RCRA permitted hazardous waste incinerator. Oversized material and debris would be decontaminated on site. Overburden, cleaned debris, oversized material and clean fill would be backfilled into the excavation. A cover would be placed over the excavation and revegetated. The excavated material would be transported to Aptus in Salt Lake City, Utah, a distance of about 560 miles. The 11,112 tons of material would require at least 505 trips for a total of 282,850 loaded miles.

Alternative 11 controls exposure to the source material through direct destruction of the organic compounds by incineration. Control or reduction of potential leaching from source

material in contact with groundwater is provided by excavating the material and subsequent thermal destruction. This alternative would meet all remedial action objectives and cleanup requirements by destroying source material. Incineration would provide long-term effectiveness and permanence and reduce the toxicity, mobility and volume of the source material. LDRs would be met. This project would take a short time to complete. No technical obstacles to implementation for this alternative are anticipated. The $24,610,942 1992 cost associated with this alternative is very high.

Alternative 12: Excavation, Thermal Desorption (TD), On-Site Backfill, Soil Vapor Extraction (SVE)

After perched water removal and treatment, the impacted material and visually contaminated soil would be excavated, neutralized, screened, sized and treated in a thermal desorption unit. Treated soil material will be cooled, hydrated and stabilized, if necessary, then backfilled within the excavation. Oversized material and debris would be steam-cleaned or reduced in size for thermal treatment. A soil cover would be installed and graded to reduce water infiltration and reseeded. In addition, a SVE system would be installed in soil underlying the clay filter material upon completion of thermal desorption treatment and backfill. SVE was considered in the original alternatives evaluation for the source material only and was not retained for further analysis because of it's ineffectiveness on low permeability clay material. However, the technology is effective for treatment of VOCs in permeable sands and gravels and is implementable at a low cost. Groundwater monitoring would continue following treatment of source material and in conjunction with SVE treatment above the water table.

Initially, thermal desorption was evaluated using incineration of VOCs. Additional considerations revolving around recent EPA policy emphasizing Pollution Prevention/Waste Minimization Options in Remediation (Pollution Prevention Act of 1990) led BNRR to propose a cleanup design involving the nondestructive removal and recovery for reuse of VOC and oil. Following change in the law, incineration was later dropped, and the pollution prevention recycling option was added. Thermal desorption with product recovery was found to be more attractive for its ability to recover materials for reuse thereby removing the necessity of on-site incineration and promoting resource recovery and pollution prevention.

This alternative would control exposure to the material through direct contact, by separating for further treatment or recycling the organic compounds in the source material. Control or reduction of leaching contaminants to groundwater is provided by treatment. This alternative is expected to achieve remediation goals for soil and to meet other applicable requirements. The alternative would provide long-term effectiveness and permanence by removing organic compounds from the source material and underlying soils. Toxicity, mobility and volume would also be reduced. The construction project could be completed within one year with little or no exposure to nearby residents. Workers would be exposed to chemicals during treatment, but they can be protected with appropriate equipment. No technical obstacles to implementation of this alternative are anticipated. Actions similar to those proposed in this

alternative are commonly implemented at other sites. Thermal desorption units can be readily mobilized and several vendors are available to perform the work and SVE systems are commonly installed to remove VOCs from soil.

The 1992 estimated cost for the original thermal desorption alternative proposed is $2,935,553. The current cost for the modified alternative, which has been updated to reflect the addition of the Resource Recovery Pollution Preventive option and 1995 vendor prices is $3,993,000. This updated cost reflects a greater degree of accuracy, and includes items not included in each of the 1992 present worth costs, such as the projected costs for health and safety upgrades, air monitoring, process sampling, and engineering oversight. Although this updated information is now available, the remainder of this alternative analysis will consider the cost for Alternative 12 as it was specified in 1992 to be consistent with evaluation of the other alternatives.

B. Comparative Analysis of Alternatives

Table 10 provides a summary of how alternatives one through twelve meet the criteria of effectiveness, implementability, and cost. Based on details provided in the preceding description of alternatives, DHES ranked the alternatives as good, fair, or poor for each of these criteria.

The effectiveness criteria is the most important alternative screening criteria. Overall protection of public health and the environment, compliance with applicable ERCLs, long-term and short-term effectiveness and reduction of toxicity, mobility, or volume through treatment are factors considered in evaluating effectiveness. If an alternative did not meet most of these factors, it received a poor ranking on effectiveness. If an alternative met most of these factors, but not all, it received a fair ranking on effectiveness. If an alternative met all these factors, it received a good ranking on effectiveness.

The only two alternatives that received a good ranking on effectiveness were alternative 11, excavation/off-site incineration, and alternative 12, excavation/ thermal desorption, on-site backfill and SVE. These alternatives were further compared on the basis of implementability and cost. While both are implementable on an administrative and technical basis, the costs for alternative 11 of $24,610,942 are significantly higher than the costs for alternative 12 of $2,935,553 (1992 cost). Therefore, DHES selected alternative 12 of excavation/ thermal desorption, backfill and SVE as the best interim action for source removal and treatment at the Mission Wye site.

VII. SELECTED ALTERNATIVE

A. Description of Thermal Desorption

Thermal desorption is an alternative treatment technology to land disposal of hazardous substances. In Innovative Site Remediation Technology, Thermal Desorption, Volume 6, EPA defines thermal desorption as: "heating waste material in a controlled environment to cause organic compounds to volatilize from the waste. The operating temperature for thermal desorption is less than 1000°F (550°C). The volatilized contaminants usually require further control or treatment." Since 1984, thermal desorption has been selected and implemented as the final remedial technology at 41 federal Superfund sites. SVE is also commonly implemented at many Superfund sites.

During thermal desorption, source materials are typically heated to volatilize water and organic contaminants. Nitrogen or another carrier gas transports volatilized water and organics to a gas treatment system. Thermal desorption is a physical separation process, not a destruction process like incineration. The advantage in separating contaminants from media like soil and clay is that the volume of contaminants, which requires further processing or recycling, is greatly reduced. Four general types of desorption units are in use today: rotary dryers, thermal screws, vapor extractors and distillation chambers.

In the selected cleanup alternative for the Mission Wye Site, the volatilized VOCs are re-liquified in a condenser for recovery and reuse. Following thermal desorption, recovery and separation units are employed to distill and separate water, oil and chlorinated fractions. The oil and chlorinated fractions should now be usable as feedstocks to petroleum and solvent refineries. Water produced during thermal desorption is treated to remove VOCs and used to re-hydrate cleaned soils exiting the thermal desorption unit.

Two reports were produced which detailed information gathered during the field and laboratory treatability studies: Excavation and Materials Handling, Mission Wye, Montana Site (RETEC, 1994) and Laboratory Treatability Study Report, Burlington Northern Railroad Mission Wye Montana Remediation Site (CCCC, 1994). The former describes the results of a field study to excavate, size, neutralize and prepare soils for thermal desorption; the latter report describes the thermal desorption treatability study which served as the basis for this remedial design.

Primary factors which control the effectiveness of thermal desorption are temperature and residence time. Moisture content of the source material and chemical and physical characteristics of contaminants are also important. System performance is usually measured by comparing untreated soil VOCs and oil concentrations with concentrations in the processed soil and clay filter material. Remediation goals serve to guide the operation of the equipment to a successful remediation goal attainment.

B. Description of Treatment Processes at Mission Wye

The treatment of the source and underlying soils at Mission Wye will require several processes to reach designated remediation goals. Field and lab treatability studies performed in November 1993 to February 1994 tested the thermal desorption process in the laboratory. The information contained in these reports assisted in the decision to select thermal desorption to treat source material and soil at Mission Wye. The treatment train at Mission Wye will consist of pre-treatment, primary treatment and post-treatment processes.

1. Pre-Treatment

Prior to excavation, perched water will be removed and treated under the Montana Groundwater Discharge Permit Control System (MGWPCS) for the site. The MGWPCS (Appendix B) is included in the Application For General Permit To Discharge Treated Waste Water From Groundwater Remediation or Dewatering Under The Montana Groundwater Pollution Control System (RETEC, 1994). A September 8, 1994 DHES letter to RETEC specifies effluent limitations and monitoring and reporting requirements for this permit.

Perched water from the north and south cells will be removed by sump pumps and piped to a holding tank. Metals removal may be conducted in a batch mode in the holding tank as necessary. Neutralized water will be pumped through a filter into an air stripper for VOCs removal. Treated water will then be pumped to a spray-irrigation network located on a one-acre plot outside of the excavation area. Table 11 shows the levels of VOCs and metals in the perched water before treatment and the levels after metals removal. The dissolved metals concentrations are an average for concentrations detected during the April 1993 groundwater sampling round, which included sampling perched water. The table shows that air-stripping and carbon adsorption are expected to remove 96.4 percent of the VOCs and that chemical oxidation and/or chemical precipitation will remove 80 percent of the metals from perched water. The MGWPCS permit requires 80 percent removal of contaminants before discharge to the ground. For metals, these discharge limits are based on the cation exchange capacity of the native soil at the site. Treated groundwater will be discharged to the ground or reused for cooling or hydrating during the primary or post-treatment processes.

Pre-treatment and material handling steps include those described in Figure 7. ALS material will be removed from the surface and stockpiled using standard excavating and loading equipment. ALS material will be treated in an asphalt melter or a heated pug mill mixer (for neutralization) prior to treatment or placed directly into the primary thermal desorption unit.

Overburden soil will be removed from each cell under conditions designed to minimize air emissions. The material will be neutralized during and after excavation. To prevent windblown particulate, neutralization materials will be stored and dispensed from covered storage silos. The partially neutralized soil and source material will be transported to a trommel screen for sizing. Oversized material may be washed or crushed and resized.

TABLE 11

MISSION WYE CECRA SITE

PERCHED WATER TREATMENT SUMMARY

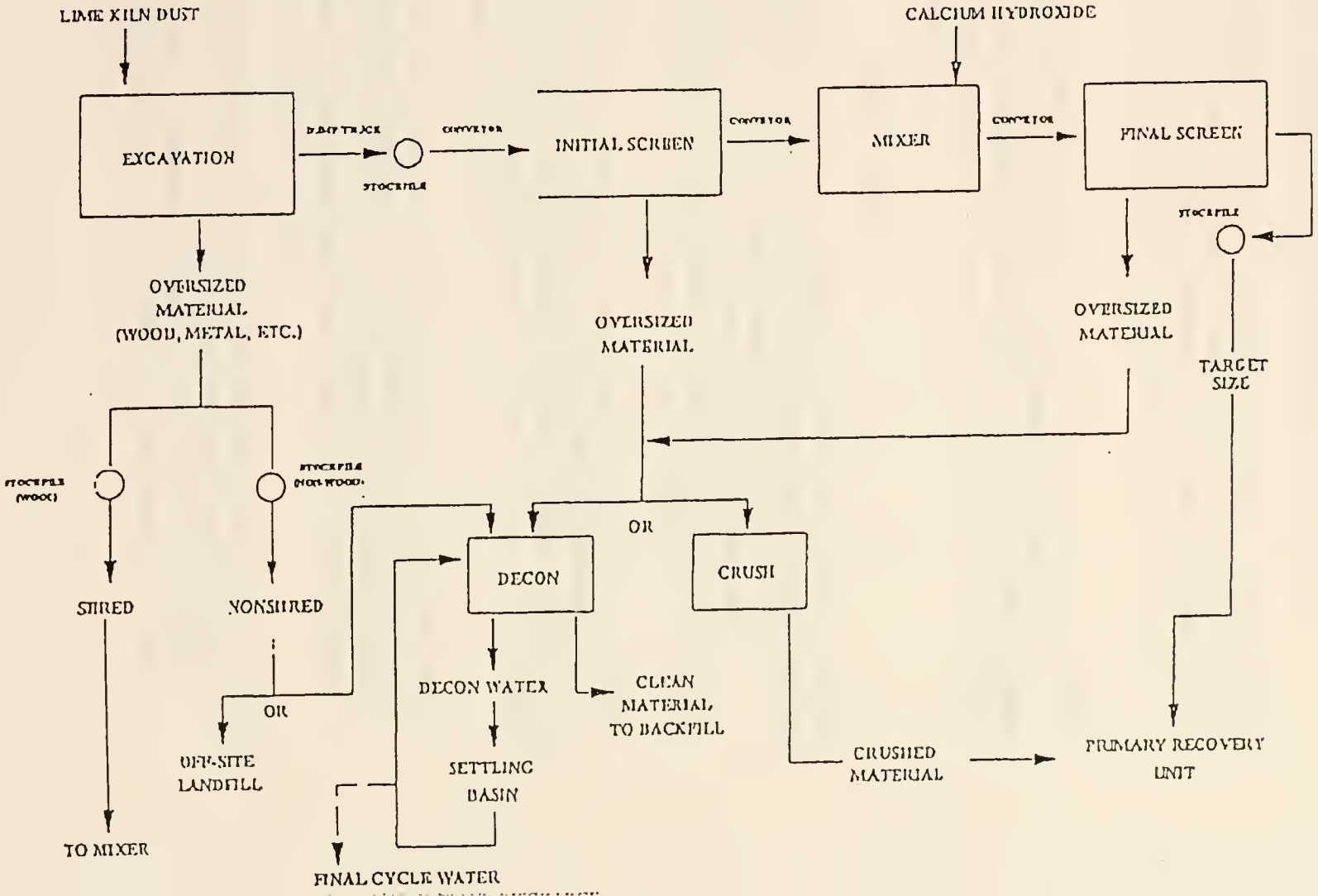
Constituent	Initial Concentration in Perched Water (µg/L)	Concentration After Metals Removal (µg/L)	Metals Removal Efficiency (%)	Concentration After Air Stripping (µg/L)	Air Stripping Removal Efficiency (%)	Concentration After Carbon Adsorption Treatment (µg/L)	Carbon Adsorption Removal Efficiency (%)
VOC Compounds[1]							
1,2 – Dichlorobenzene	220	220	NA	8	96.363	1	99.545
Tetrachloroethene	3,100	3100	NA	2	99.935	< 1	100.000
Trichloroethene	22,000	22000	NA	< 1	100.000	< 1	100.000
Xylene	84	84	NA	< 1	100	< 1	100.000
Metals, Dissolved [2]							
Arsenic	< 5	< 5	80	< 5	NA	< 5	NA
Cadmium	32.0	6	80	6	NA	6	NA
Chromium	462	92	80	92	NA	92	NA
Iron	674,000	134,800	80	134,800	NA	134,800	NA
Lead	308	62	80	62	NA	62	NA
Manganese	57,600	11,520	80	11,520	NA	11,520	NA
Zinc[1]	5,460	1,092	80	1,092	NA	1,092	NA

NA Not applicable
(1) From Phase 1 Report, RETEC 1992
(2) Average from April 1993 Monitoring Data
(3) Not analyzed

FIGURE 7

MISSION WYE CECRA SITE

PRE-TREATMENT: MATERIALS HANDLING PROCESS



Three options are available for handling the debris and will be specified in the work plan: 1) decontaminate the debris and place it back in the excavation, 2) dispose of the debris is an appropriate off-site landfill, or 3) place wood debris in the primary recovery unit.

Final neutralization will take place in a pug mill or similar mixing devise. A quality control program at the mixer outlet will ensure that target pH values are maintained prior to entry into the primary recovery unit. Transportation of materials from the mixing device to the primary recovery unit will be accomplished using front-end loaders, dump trucks and conveyors.

Air emission monitoring during the on-site treatability fieldwork showed that TCE was the only VOC detected downwind from field activities. TCE concentrations were below Occupational Safety and Health Administration permissible exposure limits. Total suspended particulate did not exceed the Occupational Safety and Health Administration total suspended particulate standard of 5 mg/m^3.

2. Primary Treatment

Properly sized and neutralized soil and source materials will be fed into a TD unit. The TD is heated to the 600-900°F range. This temperature should achieve DHES remediation goals for both VOCs and TPH and low enough to reduce combustion and cracking of hydrocarbons. A liquid condensing train attached to the exit of the unit provides for recovery of recyclable streams of chlorinated solvents and petroleum hydrocarbons. Further distillation, if necessary, will be performed to remove residual contaminants.

The process flow diagram for the primary recovery unit is outlined in Figure 8. Particulate from the primary recovery unit will be reduced by a series of particulate removal units. Finally, exit gas will flow through a mist eliminator and a carbon bed before discharge to the atmosphere in accordance with the applicable regulations. Water condensate may be treated under the MGWPCS permit for perched water.

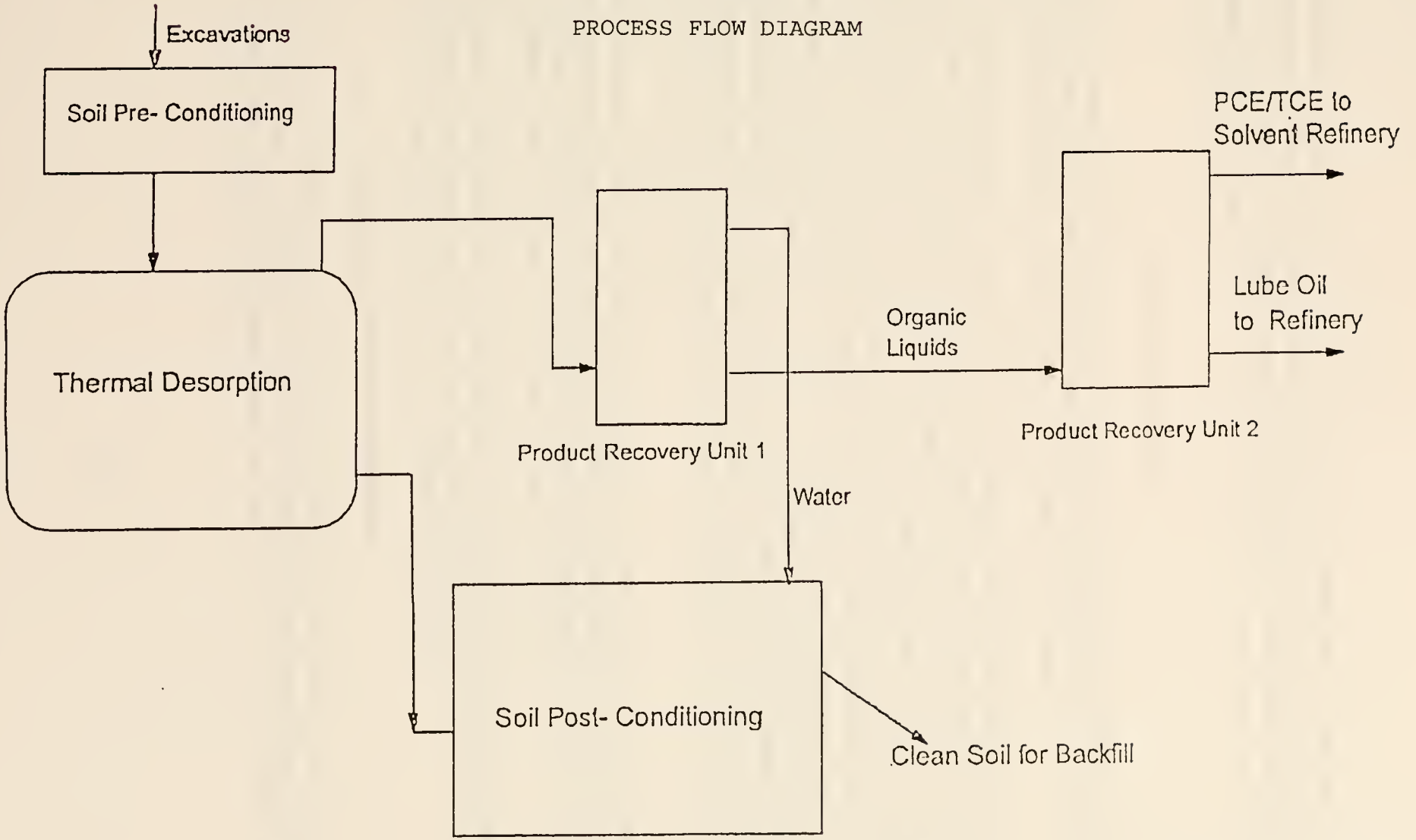
The preferred reuse of the heavy lubricating oil stream from the thermal desorption unit is to introduce this material into the refining process. The preferred reuse of the mixed solvent stream resulting from the thermal desorption unit is to transport it to a solvent refinery for distillation into new solvent. In both cases, these liquid streams should leave the site as useful feedstocks for their respective destinations.

A more detailed description of the primary recovery unit and other source material treatment steps will be provided by BNRR to DHES in a work plan for review, modification, if necessary, and approval prior to commencing fieldwork. The work plan will explain engineering plans and designs and specify sampling frequency and methods for treated materials and for stack emissions.

FIGURE 8

MISSION WYE CECRA SITE

PROCESS FLOW DIAGRAM



Client:	Burlington Northern Mission Wye Montana	
Drawn by:	JPP	Thermal Desorption PFD
Date:	[illegible]	
Rev:	0	

3. Post-Treatment

Soil post-treatment processes may include cooling and hydration before replacement into the excavation. Clean backfill will be placed in the excavation followed by treated soil to provide separation of the treated material from groundwater. Clean backfill will also be placed on the top of the treated soil and graded to final site contours before the SVE system is installed.

4. Soil Vapor Extraction

SVE is generally applied using wells or trenches for vapor extraction. The technology uses either regenerative or positive-displacement blowers for creating subsurface air flow and may require post-treatment of recovered PCE and TCE and extracted vapors.

At the Mission Wye site, SVE will be used to remediate residual chlorinated solvents in soil which may remain following excavation and thermal treatment of clay source material in the three cells. A more detailed description of the system will be provided during the detailed design phases, however, either vertical wells or horizontal wells can be used for venting. Wells will be placed in the vadose zone soils below the three cells. The fill material placed at the base of the cells following treatment will serve as a lower-permeability barrier zone to keep the SVE system from short-circuiting to the surface. Four regenerative blowers (300 cubic feet per minute flow each) would be used to generate the air flow and vacuum. Preliminary calculations using an average hydraulic conductivity of 200 feet/day indicate that 500 standard cubic feet per minute of air per cell could be produced. Based on the experience at the Livingston Rail Yard, the radius of influence of a venting well is about 150 feet in the Yellowstone alluvium.

Air emissions for the SVE system are not known at this time, however, a short-term pilot test can be performed after the system is installed to provide analytical data for the off-gas constituent concentrations. The daily and annual air emissions can be modeled, and an air treatment system, if required, can be specified based on the results.

Operation of the SVE system would continue until remediation goals for soil are attained. Soil borings and test pits will be used to obtain soil confirmation samples in the areas under the cells for laboratory analysis of VOCs, including TCE and PCE.

C. Contribution to Remedial Performance

The selected interim action, as part of a total remedial action, will attain a degree of cleanup of the hazardous and deleterious substances and control of a threatened release or further release of that substance that assures present and future protection of public health, safety, and welfare and of the environment.

This source control measure is consistent with the long-term remedy and will not preclude a final remedy. Source removal is the first step toward a permanent and long-term remedy. Subsequent groundwater monitoring for a period of one to three years will be performed after source excavation and treatment. If groundwater treatment is necessary, the selected technology will be specified in the record of decision. Institutional controls would also be specified in the record of decision. Other long-term remedial actions such as containment or biological treatment may be considered.

D. Estimated Project Costs

The total estimated 1995 present cost for thermal desorption is $3,993,000. Costs are detailed in Table 12 and include perched water removal and treatment, excavation, materials handling activities, thermal desorption, on-site backfill, soil vapor extraction and groundwater monitoring. Costs include $2,423,000 for thermal desorption treatment of approximately 6957 cubic yards of contaminated material. Total capital costs are $3,809,953. Operation and maintenance costs are $129,000, and total groundwater monitoring costs are $53,654. Engineering administration costs are $434,897.

E. Environmental Requirements, Criteria or Limitations (ERCL)

The Identification and Description of Legal Requirements for the Burlington Northern Mission Wye CECRA Site (Appendix A) describe federal and state ERCL. These ERCL specify protective requirements for actions and activities described in this Interim Action Memorandum and forthcoming work plan for the excavation and treatment of source material at Mission Wye.

F. Schedule

A public meeting will be held at 7:00 p.m. on June 22, 1995 at the City-County Building in Livingston to describe the proposed cleanup measure for Mission Wye. A 30-day public comment period on this draft Interim Action Memorandum will begin on June 22, 1995 and end at 5:00 p.m. on July 21, 1995. DHES will respond to appropriate public comments on the Interim Action Memorandum in a responsiveness summary and modify activities described and detailed in the work plan accordingly. Field work should begin in the fall of 1995.

Seasonal groundwater fluctuations will limit the time frame which excavation can occur in the north cell because, beginning in April or May, water elevations are above the bottom of this cell.

TABLE 12

MISSION WYE CECRA SITE

DETAILED COST ESTIMATE
PERCHED WATER REMOVAL, EXCAVATION,
THERMAL DESORPTION AND ON-SITE BACKFILL
FOR SOURCE CONTROL MEASURES

TASK			TOTAL COST
TREATABILITY TEST			$ 20,000
MOBILIZATION/SITE PREP.			$ 109,700
PERCHED WATER REMOVAL			$ 68,645
MATERIALS HANDLING/TREATMENT			
SOIL EXCAVATION/HANDLING	$	457,025	
THERMAL DESORPTION	$	2,423,140	
BACKFILLING	$	76,740	
SUBTOTAL MATERIALS HANDLING/TREATMENT			$2,956,905
SOIL VENTING SYSTEM CONSTRUCTION			$ 276,500
ANALYTICAL SAMPLING			$ 256,203
ENGINEERING ADMINISTRATION			$ 251,000
GROUNDWATER MONITORING			$ 53,654
GRAND TOTAL			**$3,992,607**

VIII. RECOMMENDATIONS

Pursuant to Paragraph 6.H. of the Modified Partial Consent Decree, Order and Judgement (Cause No. 88-141-H-CCL) between the DHES and BNRR entered in the United States District Court for the State of Montana on April 27, 1990, BNRR is requested to submit a work plan for excavation, treatment and final disposition of clay waste, soil and associated debris at the Mission Wye site in accordance with this Interim Removal Action Memorandum.

The work plan should detail pre-treatment, primary treatment and post-treatment processes necessary to excavate and treat source material at Mission Wye. The plan should ensure that processes meet remediation goals and established ERCLs outlined in Appendix A. A comprehensive sampling plan describing frequency and methodology should be established for the following media: waste feed, treated soil, decontaminated debris, aqueous condensate, organic condensate, cyclone particulate and off-gases. Other relevant sampling points within the treatment train should also be included. Detailed engineering and process flow diagrams should be provided once bids from vendors of choice are completed. The work plan will explain operation steps which will be implemented to ensure combustion events do not occur in the primary recovery unit. The SVE system design should include complete construction diagrams for plumbing and well construction.

The work plan will be reviewed and approved by DHES before commencing fieldwork.

Groundwater will be monitored semi-annually for one to three years after source excavation and treatment. Trends observed in monitoring data will help determine whether future groundwater treatment is necessary.

The Air Quality Division permit application would be required to be submitted to DHES; however, pursuant to 75-10-719(3) Montana Code Annotated, the procedural portion of the permit can be waived if the substantive requirements of the permit will be met. The Waste Management Division permit would be required to be submitted to DHES; however, the procedural portion of the permit can be waived if the substantive requirements of the permit will be met.

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APPENDIX A

IDENTIFICATION AND DESCRIPTION OF LEGAL REQUIREMENTS

IDENTIFICATION AND DESCRIPTION OF LEGAL REQUIREMENTS

BURLINGTON NORTHERN
MISSION WYE
CECRA SITE

Montana Department of Health
and Environmental Sciences

Superfund Program

June 22, 1995

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INTRODUCTION

Remedial actions undertaken pursuant to the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA), §§ 75-10-701 through 75-10-724, Montana Code Annotated (MCA), must "attain a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures present and future protection of public health, safety, and welfare and of the environment." § 75-10-721(1), MCA. Additionally, the Montana Department of Health and Environmental Sciences (DHES) "shall require cleanup consistent with applicable state or federal environmental requirements, criteria or limitations" and "shall consider and may require cleanup consistent with substantive state or federal environmental requirements, criteria, or limitations that are well suited to the site conditions." § 75-10-721(2)(a) and (b), MCA.

"Applicable" requirements are those that by their terms meet the jurisdictional prerequisites and apply to a given action, item or characteristic at the site. "Well suited" requirements are those requirements that are not applicable, but address situations or problems sufficiently similar to those at the site that they are well suited for use at the site. Attainment of both "applicable" requirements and designated "well suited" requirements is equally mandatory under CECRA.

In this document, DHES identifies the applicable and well suited state and federal environmental requirements for a proposed source removal at the BN Mission Wye Site. The source removal will involve treatment of the substances at the site, placement of the treated media in an on-site repository, and recovery of oil and solvent streams from the treatment process, as described in detail in the department's Action Memorandum for the source removal.

Environmental requirements, criteria and limitations are generally of three types: contaminant-specific, location-specific, and action-specific. Contaminant-specific requirements are those that establish an allowable level or concentration of a hazardous or deleterious substance in the environment or that prescribe a level or method of treatment for a hazardous or deleterious substance. Action-specific requirements are those that are triggered by the performance of a certain activity as part of a particular remedy. Location-specific requirements are those that serve as restrictions on the concentration of a hazardous or deleterious substance or the conduct of activities solely because they are in specific locations or affect specified types of areas.

In the analysis below, federal and state contaminant-specific and action-specific requirements are presented together, because they present similar and overlapping requirements. Because the site is not located within a floodplain or any known fault, and because actions at the site should not affect any wetlands, fish, wildlife, endangered species, or cultural resources, no location specific requirements are specified for this site.

The description of applicable and well-suited federal and state requirements which follows includes summaries of the legal requirements which attempt to set out the requirement in a reasonably concise fashion that is useful in evaluating compliance with the requirement. These descriptions are provided to allow the user a basic indication of the requirement

without having to refer constantly back to the statute or regulation itself. However, in the event of any inconsistency between the law itself and the summaries provided in this document, the actual requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

In addition, the applicable and well-suited federal and state requirements set forth in this document are based on the treatment processes described in the Action Memorandum. Further requirements may be imposed based on actual field equipment or conditions.

CONTAMINANT AND ACTION SPECIFIC REQUIREMENTS

I. WATER QUALITY

The Mission Wye Site is not located near any surface waters of the state. Consequently, no surface water requirements are specified for this site. Recovered water may be treated and discharged on-site in accordance with an approved MPDES permit.

The activities contemplated in this interim action do not include direct remediation of groundwater at the site. Since this is only an interim action, the determination of any groundwater remedy will be made at a later date. However, a discussion of the groundwater requirements is included here since the soil remediation goals are based in part on the achievement of groundwater standards and so that this action can be conducted with eventual attainment of these standards in mind.

A. Groundwater

1. Maximum Contaminant Levels and Maximum Contaminant Level Goals

Because the aquifer affected by the site is currently and may in the future be used as a drinking water source, the MCLs and non-zero MCLGs specified in 40 CFR Part 141 (Primary Drinking Water Standards) are well suited requirements which are ultimately to be attained by the remedy for the site. See, e.g., 40 CFR §§ 141.61 and 141.62.

Chemical	MCL (μg/L)
1,2-Dichlorobenzene	600.0
1,4-Dichlorobenzene	75.0
cis-1,2-Dichloroethene	70.0
trans-1,2-Dichloroethene	100.0
Tetrachloroethene	5.0
1,1,1-Trichloroethane	200.0
Trichloroethene	5.0

2. Montana Groundwater Pollution Control System (Applicable)

ARM 16.20.1002 classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater, and states that groundwater is to be classified

according to actual quality or actual use, whichever places the groundwater in a higher class. Class I is the highest quality class; class IV the lowest. Based upon its specific conductance, the groundwater in this operable unit must meet the standards for class I groundwater.

ARM 16.20.1003 establishes the groundwater quality standards applicable with respect to each groundwater classification. Concentrations of dissolved substances in Class I or II groundwater may not exceed the human health standards listed in department Circular WQB-7. Since an MCL for Chlorobenzene does not exist, the WQB-7 standard is more stringent than the federal ARAR and is therefore set out in boldface type.

Chemical	WQB-7 Human Health Standard (μg/L)
Chlorobenzene	**20.0**
1,2-Dichlorobenzene	600.0
1,4-Dichlorobenzene	75.0
cis-1,2-Dichloroethane	70.0
trans-1,2-Dichloroethene	100.0
Tetrachloroethene	5.0
1,1,1-Trichloroethane	200.0
Trichloroethene	5.0

Pursuant to ARM 16.20.1003, concentrations of other dissolved or suspended substances must not exceed levels that render the waters harmful, detrimental or injurious to public health. Maximum allowable concentration of these substances also must not exceed acute or chronic problem levels that would adversely affect existing or designated beneficial uses of groundwater of that classification.

ARM 16.20.1011 provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 16.20.706 et seq.

II. WASTE MANAGEMENT

A. Solid Waste Management Regulations (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq., MCA, specify requirements that apply to the location of any solid waste management facility. For any solid (noncharacteristic) waste left after treatment, as opposed to treated media, the standards set forth are applicable.

ARM 16.14.504 sets forth the facility classification system for the treatment, storage or disposal of solid wastes. For noncharacteristic material, as opposed to media, the general regulations and the regulations concerning class II sites promulgated pursuant to the Act are applicable to this remedy. (If the material, including media, remains characteristic after treatment, the general regulations and the regulations concerning class I sites promulgated

pursuant to the Act are applicable to this remedy, and the material, including media, must be disposed of off-site at an appropriate land disposal unit.)

Under ARM 16.14.505, a facility for the treatment, storage or disposal of solid wastes:

(a) must be located where a sufficient acreage of suitable land is available for solid waste management;

(b) may be located only in areas which will prevent the pollution of ground and surface waters and public and private water supply systems;

(c) must be located to allow for reclamation and reuse of the land;

(d) drainage structures must be installed where necessary to prevent surface runoff from entering waste management areas; and

ARM 16.14.505(3)(b) requires adequate separation of group II wastes from underlying or adjacent water. The extent of separation shall be established on a case-by-case basis, considering terrain and the type of underlying soil formations. Class I sites must confine solid waste and leachate to the disposal site. If there is a potential for leachate migration, it must be demonstrated that the leachate will only migrate to underlying formations which have no hydraulic continuity to any state waters.

ARM 16.14.505 also specifies general soil and hydrogeological requirements pertaining to the location of any solid waste management facility.

ARM 16.14.521 sets forth general operational and maintenance and design requirements for solid waste management systems. ARM 16.14.521 sets forth specific operational requirements, specifies run-on and run-off control systems and requires sites to be fenced to prevent unauthorized access.

B. Transportation of Solid Waste (Applicable)

For solid wastes, § 75-10-212 prohibits dumping or leaving any debris or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted.

C. Hazardous Waste Management Regulations (Applicable)

The Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 et seq., and the Montana Hazardous Waste and Underground Storage Tank Act, §§ 75-10-401 et seq., MCA, and regulations under these acts establish a regulatory structure for the generation, transportation, treatment, storage and disposal of hazardous wastes. These requirements are applicable to substances and actions at the site which involve hazardous wastes.

Wastes may be designated as hazardous by either of two methods: listing or demonstration of a hazardous characteristic. Listed wastes are the specific types of wastes determined by EPA

to be hazardous as identified in 40 CFR Part 261, Subpart D (40 CFR §§ 261.30 - 261.33).[1] Listed wastes are designated hazardous by virtue of their origin or source, and must be managed as hazardous wastes regardless of the concentration of hazardous constituents. Characteristic wastes are those that by virtue of concentrations of hazardous constituents demonstrate the characteristic of ignitability, corrosivity, reactivity or toxicity, as described at 40 CFR Part 261, Subpart C (40 CFR §§ 261.20 - 261.24) and ARM 16.44.320-16.44.324.

The wastes at the site demonstrate the characteristic of toxicity, and are therefore characteristic hazardous wastes. Because of the presence of characteristic hazardous waste, the substantive portion of the permit requirements specified in ARM 16.44.106 must be met.

Set out below are the hazardous waste requirements that are applicable or well suited for the types of waste management units or the waste management practices anticipated in the source control removal through treatment proposed for the site. Further refinement or modification of these standards will occur after submittal of a work plan when more detailed information is available regarding the handling of the hazardous wastes (for example, which hazardous waste units will be necessary for temporary storage).

1. Standards for Generators of Hazardous Waste

The regulations at ARM 16.44.401-425, substantially equivalent to RCRA regulations at 40 CFR Part 262, establish standards that apply to generators of hazardous waste. These standards include requirements for example, of filing certain reports. These standards are applicable.

2. Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

a. Releases from Solid Waste Management Units

The regulations at 40 CFR 264, Subpart F,[2] establish requirements for groundwater protection for RCRA-regulated solid waste management units (i.e., waste piles, surface impoundments, and land treatment units). Compliance with these regulations is required for any units used in source removal or treatment.

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[1] These listings are incorporated and enforceable as part of Montana's authorized RCRA program. See ARM §§ 16.44.330 - 16.44.332. The Montana regulations cover those wastes listed in the 1992 version of the CFR. See ARM 16.44.102(5). Any wastes subsequently listed by EPA and not yet covered by the state authorized program are covered by the federal RCRA regulations.

[2] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

Under 40 C.F.R. Part 264, Subpart F [3], concentration limits are set for hazardous constituents in groundwater. The limits specified for groundwater protection in this section are generally the same as the MCLs discussed above.

The regulations at 40 CFR 264, Subpart F, also establish monitoring requirements for RCRA-regulated solid waste management units (i.e., waste piles, surface impoundments, land treatment units, and landfills). Subpart F provides for three general types of groundwater monitoring: detection monitoring (40 CFR § 264.98); compliance monitoring (40 CFR § 264.99); and corrective action monitoring (40 CFR § 264.100). Monitoring wells must be cased according to § 264.97(c).

Monitoring is required during the active life of a hazardous waste management unit. If hazardous waste remains, the monitoring requirements continue during the 40 CFR § 264.117(c) closure period. The work plan will require closure of all units after treatment is complete.

b. Closure and Post-Closure Monitoring and Maintenance of Waste Management or Disposal Facilities

40 CFR Part 264, Subpart G,[4] establishes that hazardous waste management facilities must be closed in such a manner as to (a) minimize the need for further maintenance and (b) control, minimize or eliminate, to the extent necessary to protect public health and the environment, post-closure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.

Facilities requiring post-closure care must undertake appropriate monitoring and maintenance actions, control public access, and control post-closure use of the property to ensure that the integrity of the final cover, liner, or containment system is not disturbed. 40 CFR § 264.117. In addition, all contaminated equipment, structures and soil must be properly disposed of or decontaminated unless exempt. 40 CFR § 264.114.

c. Waste Containers and Tanks

40 CFR Part 264, Subparts I, J and K,[5] apply to owners and operators of facilities that store hazardous waste in containers, store or treat hazardous waste in tanks, or treat, store or dispose of hazardous waste in surface impoundments, respectively. These regulations are applicable to any storage or treatment in these units at the site. The provisions of 261.7, residues of hazardous waste in empty containers, are also applicable.

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[3] The State of Montana implements an authorized RCRA program which includes the groundwater protection standards of 40 CFR Part 264, Subpart F, (1992) as incorporated by reference in ARM 16.44.702.

[4] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

[5] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

d. Waste Piles

40 CFR Part 264, Subpart L,[6] applies to owners and operators of facilities that store or treat hazardous waste in piles.[7] The regulations require the use of run-on and run-off control systems and collection and holding systems to prevent the release of contaminants from waste piles. These regulations are applicable to any storage in waste piles at the site.

e. Miscellaneous Units

40 CFR Part 264, Subpart L, applies to owners and operators of facilities that store or treat hazardous waste in miscellaneous units. Miscellaneous units must be located, designed, constructed, operated, maintained and closed in a manner that will ensure protection of human health and the environment. These regulations are applicable to any treatment or storage in miscellaneous units at the site.

f. Hazardous Waste Air Emission Standards

For the recovery processes, the requirements of 40 CFR part 264, subpart AA, Air Emission Standards for Process Vents, are well-suited.

3. RCRA Land Disposal Restrictions (Applicable)

Since the wastes to be treated are characteristic wastes for toxicity, the RCRA Land Disposal Restrictions (LDRs), 40 CFR Part 268, 59 Fed. Reg. 47982 (September 19, 1994) are applicable requirements establishing treatment level for the treatment of the wastes at the site. For the soils treated by Soil Vapor Extraction, the LDRs are well-suited requirements. Land disposal restrictions typically set concentration levels or treatment standards that hazardous wastes must meet before they can be land disposed. These treatment standards typically represent best demonstrated available treatment technology (BDAT) for hazardous wastes. Any treatment technology may be used if it will achieve the specified concentration levels and is not otherwise prohibited. See Superfund LDR Guide #3, Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions, OSWER Dir. No. 9347.3-03FS (July 1989).

For the primary chemicals of interest the LDR levels for the characteristic wastes are set forth below.

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[6] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

[7] "Pile" means any non-containerized accumulation of solid, nonflowing hazardous waste that is used for treatment or storage. 40 CFR § 260.10.

Chemical	LDR Treatment Standard (mg/kg)
Chlorobenzene	6.0
1,2-Dichlorobenzene	6.0
1,4-Dichlorobenzene	6.0
trans-1,2-Dichloroethene	30.0
Tetrachloroethene	6.0
1,1,1-Trichloroethane	6.0
Trichloroethene	6.0

4. Recyclable Materials (Applicable)

RCRA and the Montana Hazardous Waste and Underground Storage Tank Act both contain regulations pertaining to recyclable materials. In order to qualify as a recyclable material, the chlorinated fractions resulting from the by-product stream and the oil must meet the substantive and procedural requirements specified in 40 CFR 261.2, 261.6. and ARM 16.44.306. This will require the recyclable material to meet the generator and transporter requirements of parts 262 and 263 as well as the applicable storage requirements set forth in 264, subparts A through L, AA, BB, parts 124, 266, 268, and 270 and the notification requirements of section 3010 of RCRA (for recyclable materials). In addition, used oil would also be subject to 40 CFR 279. The determination of whether the by-product streams meet the recyclable material exception will be finalized after more detailed information is set forth in the work plan. However, it is the goal of the department to require treatment and distillation to an extent that the chlorinated fractions and the oil exit the site as useful products.

5. Transportation of Hazardous Waste (Applicable)

ARM 16.44.501 and 40 CFR Part 263 establish regulations for the transportation of hazardous waste. Any off-site transportation of hazardous waste, would be subject to ARM 16.44.501 and Part 263 as independently applicable regulations.

III. AIR QUALITY

The remedy at the site has air emissions during excavation in the pre-treatment phase, from the thermal desorption unit in the treatment phase, and from the soil vapor extraction system in the post-treatment phase. The standards set forth below are applicable to the remedy.

A. Ambient Air Quality Standards (Applicable)

Under the federal Clean Air Act, 42 U.S.C. §§ 7401-7671q, the Administrator of the EPA is authorized and directed to promulgate national ambient air quality standards for specific air pollutants. See 42 U.S.C. § 7409. States are required to develop plans to implement, maintain and enforce such standards in their jurisdictions. 42 U.S.C. § 7410. Montana has adopted ambient air quality standards in ARM 16.8.801 et seq.. The State standards are enforceable under State law and, to the extent the State standards are equivalent to the

federal standards and are part of the EPA-approved State Implementation Plan, the State standards are also federally enforceable.[8]

The following ambient air quality standards are applicable for any of the following that may be emitted at the site:

ARM 16.8.817. Ambient air quality standard for ozone. No person shall cause or contribute to concentrations of ozone in the ambient air exceeding: 0.10 ppm 1-hour average.

ARM 16.8.818. Ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter.

ARM 16.8.821. Ambient air quality standards for PM-10. PM-10 concentrations in the ambient air shall not exceed the following standards: 150 micrograms/cubic meter of air, 24-hour average; and 50 micrograms/cubic meter of air, expected annual average.

Each of the ambient air quality standards set forth above includes in its terms specific requirements and methodologies for monitoring and determining levels. Such requirements are also applicable requirements. In addition, ARM 16.8.807 and 16.8.809, Ambient Air Monitoring; Methods and Data, respectively (Applicable), require that all ambient air monitoring, sampling and data collection, recording, analysis and transmittal shall be in compliance with the Montana Quality Assurance Manual except when more stringent requirements are determined by DHES to be necessary.

B. Emission Standards (Applicable)

Montana has promulgated standards to regulate emissions of certain contaminants into the air. See ARM 16.8.1401 et seq. The state emission standards are enforceable under the Montana Clean Air Act, §§ 75-2-101 et seq., MCA.

The following air emission standards are applicable at the site:

ARM 16.8.1401. Airborne Particulate Matter. Emissions of airborne particulate matter from any stationary source shall not exhibit an opacity of 20 percent or greater, averaged over six consecutive minutes. This standard applies to the production, handling, transportation, or storage of any material; to the use of streets, roads, or parking lots; and to construction or demolition projects.

ARM 16.8.1404. Visible Air Contaminants. No source may discharge emissions into the atmosphere that exhibit an opacity of 20 percent or greater, averaged over six consecutive

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[8] The ambient standards for lead and PM-10 (ARM §§ 16.8.815 and 821) are enforceable under both State and federal law. The ambient standards for ozone and settled particulate matter (ARM §§ 16.8.817 and 818) are enforceable under State law.

minutes. This standard is limited to point sources, but excludes wood waste burners, incinerators, and motor vehicles.

ARM 16.8.1427. Odors. If a business or other activity will create odors, those odors must be controlled, and no business or activity may cause a public nuisance.

ARM 16.8.1302 lists certain wastes that may not be disposed of by open burning[9], including oil or petroleum products, RCRA hazardous wastes, chemicals, and treated lumber and timbers. Any waste which is moved from the premises where it was generated and any trade waste (material resulting from construction or operation of any business, trade, industry or demolition project) may be open burned only in accordance with the substantive requirements of 16.8.1307 or 1308.

C. State Air Quality Permit Requirements (Applicable)

The department shall require such equipment, controls or procedures to provide reduction of air pollutants at least equivalent to reductions achieved through the best available control technology.

In addition, the permit requirements of ARM Title 16, Chapter 8, Subchapter 11, provide additional criteria and conditions applicable to issuance of an air quality permit, as discussed below.

ARM 16.8.1102 requires that permits be obtained for the construction, installation, alteration, or use of specified air contaminant sources. This requirement is applicable. Although the Department has determined a waiver of the permit is appropriate pursuant to MCA 75-10-721(3), all substantive requirements of the permit must be observed.

ARM 16.8.1103 requires sources for which air quality permits are required to use best available control technology (BACT) or to meet the lowest achievable emission rate (LAER), as applicable.

D. Other Laws

These laws are nonenvironmental laws which are independently applicable at the site.

1. Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 29 CFR § 1910 are applicable to worker protection during conduct of remedial activities.

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[9] "'Open burning' means combustion of any material directly in the open air without a receptacle, or in a receptacle other than a furnace, multiple chambered incinerator or wood waste burner ..." ARM 16.8.1301(5).

2. Groundwater Act

Section 85-2-505, MCA, precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained so as to prevent waste, contamination, or pollution of groundwater.

Section 85-2-516, MCA, states that within 60 days after any well is completed a well log report must be filed by the driller with the DNRC and the appropriate county clerk and recorder.

3. Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the maximum benefit to the people and with minimum degradation of natural aquatic ecosystems.

Parts 3 and 4 of Title 85, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws which must be complied with in any action using or affecting waters of the state. Some of the specific requirements are set forth below.

Section 85-2-301, MCA, of Montana law provides that a person may only appropriate water for a beneficial use.

Section 85-2-306, MCA, specifies the conditions on which groundwater may be appropriated, and, at a minimum, requires notice of completion and appropriation within 60 days of well completion.

Section 85-2-311, MCA, specifies the criteria which must be met in order to appropriate water.

Section 85-2-402, MCA, specifies that an appropriator may not change an appropriated right except as provided in this section with the approval of the DNRC.

4. Occupational Health Act, §§ 50-70-101 et seq., MCA.

ARM § 16.42.101, along with the similar federal standard in 29 CFR § 1910.95, addresses occupational noise.

ARM § 16.42.102, along with the similar federal standard in 29 CFR § 1910.1000 addresses occupational air contaminants.

5. Montana Safety Act

Sections 50-71-201, 202 and 203, MCA, state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and

safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe.

6. Employee and Community Hazardous Chemical Information Act

Sections 50-78-201, 202, and 204, MCA, state that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.

E. Permit requirements

The remedy will involve discharge of treated waste water from the remediation pursuant to the Montana Groundwater Pollution Control System (MGWPCS General Permit no. 1003). The MGWPCS General Permit requirements are independently applicable. In addition, the groundwater standards listed in the above groundwater section must also be met.

There are presently no Air Quality or Waste Management permits for this action. MCA § 75-10-721(3) gives the department the authority to exempt an onsite cleanup action from a specific permit requirement for an action conducted entirely onsite. However, the procedural and substantive requirements of the permit process must still be observed.

This action would qualify for an exemption for the Air Quality and Waste Management permits required for this action.

APPENDIX B

MGWPCS GENERAL PERMIT NO. 1003

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
WATER QUALITY BUREAU

Room A-206
COGSWELL BUILDING
1400 BROADWAY

STATE OF MONTANA

FAX (406) 444-1374
Phone # (406) 444-2406

PO BOX 200901
HELENA, MONTANA 59620-0901

September 8, 1994

RE: Authorization MGWPCS-G1003 to Discharge Under the "General Permit To Discharge Treated Waste Water From Ground Water Remediation Or Dewatering Under The Montana Ground Water Pollution Control System Permit" Park County, T1S, R10E, Section 35

The department has reviewed Burlington Northern Railroad's application to discharge wastewater and has determined your discharge qualifies for permitting under the "General Permit To Discharge Treated Waste Water From Ground Water Remediation Or Dewatering", Under The Montana Ground Water Pollution Control System Permit, a copy of which is attached.

Therefore, authorization is granted to discharge at the above-referenced location, under the provisions of the "General Discharge Permit,". The General Discharge Permit is valid only when accompanied by this authorization letter.

Please take special note of the effluent limitations, self-monitoring, and reporting requirements attached to this authorization letter. Any violation of these requirements or any other provision of the General Permit is subject to enforcement action by this Department pursuant to the Montana Water Quality Act.

On all correspondence and reporting forms, please reference your new MGWPCS Permit Number, (MGWPCS-1003).

Your authorization to discharge under the "General Discharge Permit" shall expire on March 15. 1999.

If you have any questions or comments feel free to contact the Permits Section of this office at 444-2406.

received
9/8/94

John L. Arrigo, Supervisor Ground Water Section
Water Quality Bureau
Environmental Sciences Division

Attachment: Effluent limitations, self-monitoring and reporting requirements

MGWPCS GENERAL PERMIT NO. 1003

RE: Effluent limitations, self-monitoring, and reporting requirements for MGWPCS General Permit No. 1003 issued to Burlington Northern Railroad for the Mission Wye Site located at T1S, R10E, Section 35.

These requirements are modified from "Application For General Permit To Discharge Treated Waste Water From Groundwater Remediation Or Dewatering Under The Montana Ground Water Pollution Control System" Prepared by Remediation Technologies, Inc, Fort Collins, CO dated June 1994.

Effluent limitations and reporting limits:

Parameter	Reporting Limit		Effluent Limit	
1,2 Dichlorobenzene	1.0	ug/l	< 1.0	ug/l
Tetrachloroethene	0.5	ug/l	< 0.5	ug/l
Trichloroethene 0.5 ug/l	0.5	ug/l	< 0.5	ug/l
Xylene	1.5	ug/l	< 1.5	ug/l
Arsenic	3.18	ug/l	< 3.18	ug/l
Cadmium	0.1	ug/l*	6.0	ug/l**
Chromium	1.0	ug/l*	92.0	ug/l**
Iron	10.0	ug/l*	134,800	ug/l**
Lead	3.18	ug/l*	62.0	ug/l**
Manganese	5.0	ug/l*	11,520	ug/l**
Zinc	10.0	ug/l*	1,092	ug/l**

* Higher detection levels may be used if it has been demonstrated that the higher detection levels will be less than 10% of the expected level of the sample.

** Effluent limits are above reporting limits and trigger values but the adsorption capacity of the soils has been documented and no ground water impacts will result.

Self-monitoring locations, schedule and Reporting:

The influent waste water stream and effluent waste water stream must be sampled before and after complete treatment. Monitoring wells MW-2,5,6 and 7 must be sampled before application, monthly during land application and for three months following application.

The following sampling and reporting schedule must be followed for the waste stream:

Sampling Period	Sampling Frequency
Week one	Daily (six events)
Week two through four	Weekly (three events)
Month two forward	Biweekly (twice per month)

Reporting Frequency

Section B of MGWPCS General Permit No. 1000 is here changed to monthly reporting.

Effluent samples that do not meet the effluent limits must be immediately reported by telephone to the Department.

Permit No.: MGWPCS-G1-000

MONTANA DEPARTMENT OF HEALTH
AND
ENVIRONMENTAL SCIENCES

GENERAL PERMIT TO DISCHARGE TREATED WASTE WATER FROM GROUND WATER REMEDIATION OR DEWATERING UNDER THE MONTANA GROUND WATER POLLUTION CONTROL SYSTEM

In compliance with Section 75-5-101 et seq., MCA, and ARM 16.20.1022, and ARM 16.20.1317, et seq., applicants with an authorization letter for this "Treated Waste Water From Ground Water Remediation or Dewatering General Permit" are permitted to discharge treated waste water to ground water in accordance with effluent limitations, monitoring requirements and other conditions set forth herein. Discharge may be by injection, infiltration, or land application.

The permit shall become effective on the date of issuance.

A written authorization letter from the Department is required before an applicant is authorized to discharge under the Ground Water Remediation or Dewatering General Discharge Permit.

This permit and the authorization to discharge shall expire at midnight, March 15, 1999.

FOR THE MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

John Arrigo, Manager
Ground Water Section
Water Quality Bureau
Environmental Sciences Division

Dated this day of 1993.

A. Treatment Requirements, Effluent Limitations and Self-Monitoring Requirements

The purpose of the General Permit is to accelerate remediation activities and allow for the dewatering of contaminated ground water in a manner which will prevent further contamination and ensure adequate treatment prior to discharge.

During the period specified in the authorization letter the permittee is authorized to discharge treated waste water from ground water remediation or dewatering activities. Treatment of waste water is required prior to discharge. Treatment may include: granular activated carbon adsorption, photodegradation, enhanced volatilization, biodegradation, settling, soil attenuation, evaporation, ion exchange, reverse osmosis or other approved treatments or a combination of these treatments to meet the effluent limitations. Some treatment methods may require additional permits from the Air Quality Bureau of the Department of Health.

The authorized discharge must conform to the following stipulations: 1) In most cases waste water may only be discharged into or above the contaminated aquifer from which it was removed, 2) Treated Waste Water may only be discharged into ground water that has higher concentrations of the parameters of concern, 3) Treated waste water must be discharged in a manner that will not cause an increase in the concentration or extent of ground water contamination, 4) If waste water is treated to below detection limits it may be land applied in areas outside the contaminated aquifer if hydrologic conditions and volumes are such that it is unlikely to impact ground water.

Under this permit the Department may issue authorization letters which authorize short-term exemptions from the water quality standards, or short-term use that exceeds the water quality standards, and the limitations set forth in this permit in accordance with 75-5-308 MCA.

Discharges shall be treated, limited and monitored by the permittee as specified below:

1. Treatment Requirements

Parameter	Treatment Requirement
Applicable WQB Circular 7 Parameters Present in Waste Water	80% removal

2. Effluent Limitations for treated waste water.*

Parameter	Daily Maximum
Applicable WQB Circular 7 Parameters Present in Waste Water	Less than receiving water

* EPA methods as outlined in WQB Circular 7 for the measurement of the parameters of concern must be used.

3. Site-Monitoring Requirements*

Parameter	Frequency
Applicable WQB Circular 7 Parameters Present in Waste Water	Daily for the first week, Weekly for the first month, Monthly for the first year, Quarterly there after
Discharge Volumes	"

* Monitoring requirements may be modified by written request of the permittee and approval by the Department.

Sample Type

Specified in Authorization

4. Monitoring Locations

Samples of waste water taken in compliance with the monitoring requirements specified above shall be taken at the following locations: 1) prior to treatment and 2) nearest accessible point after final treatment but prior to actual discharge to ground water or land application. Soil and/or ground water monitoring may be required, at the Department discretion, in application areas depending on remediation strategies.

B. REPORTING REQUIREMENTS

Self-monitoring reports shall be submitted to the Department as defined in the letter of authorization. At a minimum quarterly submittal of monitoring will be required. Monitoring results obtained during the previous reporting period shall be summarized and reported to the Department, postmarked no later than the 28th day of the month following the completed reporting period. Signed copies of these, and all other reports required herein, shall be submitted to the Department at the following address:

Montana Department of Health & Environmental Sciences
Water Quality Bureau
Cogswell Building, Room A-206
Helena, Montana 59620-0909
Phone: (406) 444-2406

C. DEFINITIONS

1. The "Department" means the Montana Department of Health and Environmental Sciences.

2. "State Waters" means any body of water, irrigation system, or drainage system, either surface or underground; however, this subsection does not apply to irrigation waters where the waters are used up within the irrigation system and the waters are not returned to any other state waters.

3. "Waste Water" is water that is contaminated with any of the parameters listed in WQB Circular 7 above naturally occurring background levels.

4. "Treated Waste Water" is waste water that has received the minimum treatment as provided in this permit: ie, 80% removal of contaminants of concern and less than receiving waters.

5. A "grab sample," for monitoring requirements, is defined as a single "dip and take" sample collected in a manner to make it representative of the location being sampled.

6. "Daily Maximum" is the maximum value allowable in any single sample or instantaneous measurement.

7. An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

8. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

D. TEST PROCEDURES

Unless otherwise stated, test procedures for the analysis of pollutants shall conform to regulations published in, or subsequent revisions to, Part 136, Title 40 of the Code of Federal Regulations. Sample collection and preservation shall be in accordance with EPA methods as outlined in WQB-7. (The Department's Treatment and Preservation Guide should be consulted for acceptable sample collection and preservation techniques.)

E. RECORDING OF RESULTS

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

1. Description of sampling site (Township, Range, Section 1/4 Section, and Site Name or street address), date, and time of sampling;

2. The dates the analyses were performed;

3. The person(s) or laboratory who performed the analyses;

4. The analytical techniques or methods used; and

5. The results of all required analyses, and copies of laboratory analytical reports.

F. ADDITIONAL MONITORING BY PERMITTEE

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the monitoring report. Such increased frequency shall also be indicated.

G. RECORDS RETENTION

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if requested by the Department.

H. CHANGE IN OPERATION

Operation of the facility must be consistent with the conditions of the permit; any sewerage system, treatment works or disposal system expansions, production increases or process modifications which may result in a change of operation must be reported to the Department. After review of this information, the Department will determine whether submission of a new or modified MGWPCS permit application is necessary.

I. NONCOMPLIANCE NOTIFICATION

If, for any reason, the permittee does not comply with or will be unable to comply with any condition specified in this permit, the permittee shall provide the Department with the following information, immediately by telephone and in writing, within five (5) days of becoming aware of such noncompliance:

1. A description and cause of noncompliance; and

2. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the problem.

J. FACILITIES OPERATION

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

K. ADVERSE IMPACT

The permittee shall take all reasonable steps to minimize any adverse impact to state waters resulting from noncompliance with any discharge limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

L. BYPASSING

Any diversion from or bypass of treatment or control facilities or systems necessary to maintain compliance with the terms and conditions of this permit is prohibited.

If, for any reason, a partial or complete bypass of the wastewater or holding facilities is considered necessary, a request for such bypass shall be submitted to the Department at least sixty (60) days prior to the proposed bypass. If the proposed bypass is judged acceptable by the Department, the bypass will be allowed subject to limitations imposed by the Department.

If, after review and consideration, the proposed bypass is determined to be unacceptable by the Department, or if the limitations imposed on an approved bypass are violated, such bypass shall be considered a violation of this permit; and the fact that application was made, or that a partial bypass was approved, shall not be defense to any action brought thereunder.

M. REMOVED SUBSTANCES

Solids, sludges, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering state waters.

N. TRANSFER OF OWNERSHIP OR CONTROL

In the event of any change in control or ownership of the source authorized by this permit, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Department.

O. AVAILABILITY OF REPORTS

Except for data determined to be confidential under Section 75-5-105, MCA, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Monitoring data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 75-5-633, MCA.

P. PERMIT MODIFICATION

After notice and opportunity for a hearing, this MGWPCS permit may be modified, suspended, or revoked in whole or in part during its term under provisions of Sections 75-5-403 and 75-5-404, MCA, for cause, including, but not limited to, any of the following:

1. Violation of any conditions of this permit;

2. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

3. A change in any condition or a violation of state water quality standards or degradation of high quality state waters caused by this discharge that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

4. A failure or refusal by the permittee to comply with the requirements of Section 75-5-602, MCA.

Q. ACCESS

The permittee shall allow personnel of the Department, and/or their authorized representatives, upon the presentation of credentials:

1. To enter upon the permittee's premises where source is located or in which any records are kept; and

2. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

R. PROPERTY RIGHTS

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

S. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

T. REAPPLICATION

If the permittee desires to continue to discharge beyond the expiration date of this permit, he shall reapply, in writing, to the Department at least one hundred-eighty (180) days prior to the expiration date of this permit.

U. OTHER REQUIREMENTS

1. All areas disturbed by the treatment facility must be reclaimed to prior stability and utility.

2. No discharge of treated waters will be permitted in areas where ground water quality is unknown.

3. In areas of proposed discharge where insufficient ground water quality data exists to identify base line contamination, new data must be obtained.

4. The discharge area must be inspected weekly to confirm that surface runoff is not taking place and the discharge system is operating as proposed.

5. Ground water flow and aquifer characteristics must be documented and reported prior to discharge for review by the Department.